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ABSTRACT

The papers in this proceedings of the Council for Programs in Technical and Scientific Communication (CPTSC) conference discuss collaboration with other disciplines, with business and industry, and with research foundations, reflecting the readiness to reach out that characterizes CPTSC in its second decade. Papers in the proceedings are: "Problems in Designing Graduate Programs in Technical Communication" (Carolyn R. Miller); "Graduate Technical Writing Programs: Determining Audience vs. Shaping It" (Kristin R. Woolever); "How 'Technical' Should Our Technical Communication Students Be?" (JoAnn T. Hackos); "A Practitioner's View of Technical Communication Education" (Lionel A. Howard, Jr.); "Industry and Education Working Together: The Use of Advisory Committees" (Sherry Burgus Little); "Seeing Both the Silicon Forest and Its Trees: Achieving Currency in a Scientific-Technical Communications Program" (E. Richard Kreighbaum and others); "Who Are Our Students?" (Judith Kaufman); "An English Major for Professional Writers" (Scott P. Sanders); "Technical Communication and Engineering Technology: New Programs Developing Together" (Maria Curro Kreppel); "Finding Jobs for Technical Writing Students" (Sally A. Jacobsen); "Is There Funding for Individual and Group Research in Technical Communication?" (Marilyn Schauer Samuels); "The Challenges of Consensus Theory in Modern Rhetoric for Teaching Technical Writing" (Daniel R. Jones); "Teaching Collaborative Technical Writing Projects" (Gloria Jaffe); "The Place of 'Media Literacy' in the Technical Communication Curriculum" (Sam C. Geonetta); "Visual Rhetoric in Technical Communication: 1. Theoretical, Empirical, and Intuitive Bases; 2. The Impact of the Computer" (Ben F. Barton and Marthalee S. Barton); "Approaches to Theories of Grammar: An Unexamined Chapter in Technical Writing Texts" (Mary B. Coney); "Technical Writing and the Vulgate" (Edgar S. Laird); "The 'De Linguae Latinae' of Lorenzo Valla and the Teaching of Technical Writing" (Lawrence J. Johnson); and "English Literature and Technical Writing Courses Both Contain Humane Content" (Joseph C. Mancuso and Anita Ross). The proceedings also includes a message from the president of CPTSC, the conference program, and results of the annual business meeting. Appendixes presenting the constitution, lists of meeting sites and dates, a list of members, a map locating institutions represented by members, and tables of contents of earlier meetings are attached. (RS)

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Proceedings

1985

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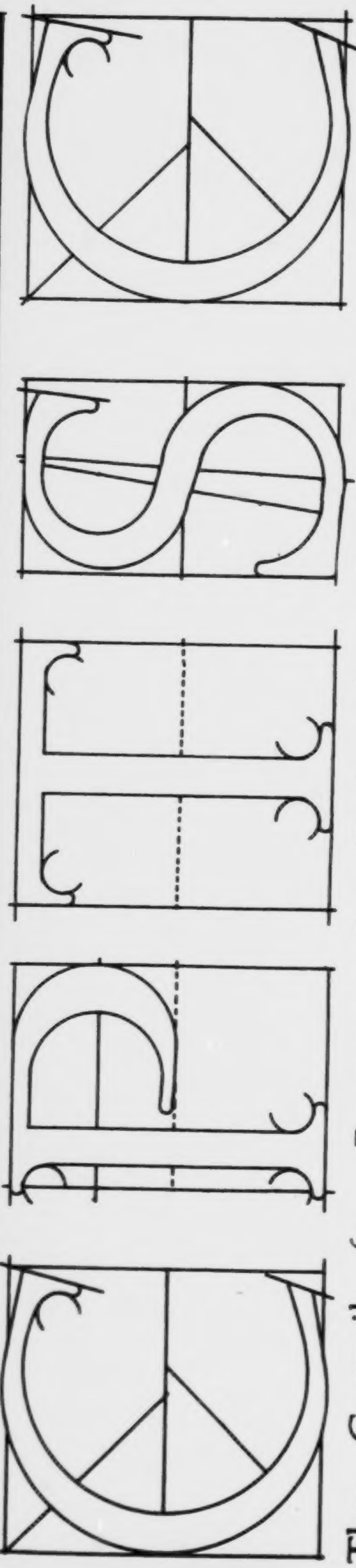

The Council for Programs in Technical and Scientific Communication

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PROCEEDINGS 1985

The Council for Programs
in
Technical and Scientific
Communication

Marilyn Schauer Samuels
editor

12th
ANNUAL
MEETING

Oxford, Ohio
February 13-15, 1985

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PREFACE

Over the icy state road and through the woods to the annual meeting we went. The white-knuckled driver knew the way --fortunately-- because he could not see a thing in front of him. As the van holding several notable people in the field of technical writing swerved to miss oncoming vehicles on the narrow two-lane path, I pondered how devastating it would be for editors of major journals should the occupants of our precarious transport never reach their destination-- the Marcum Conference Center of Miami University, Oxford, Ohio.

But arrive we did, the stalwart northeasterners in their thermal underwear and parkas; the less-acclimatized southerners and westerners in their trenchcoats-- linings zipped in hastily. Our gracious host, Paul V. Anderson, made several trips to the airport in his own buggy to retrieve relentless members who had defied local snowdrifts to put in a belated but enthusiastic appearance.

Our winter retreat was warming and productive. Heartened by pleasant facilities and appetizing food, we experienced the informal, sustained exchanges of information and ideas that have become unique to CPTSC Annual Meetings, regardless of the weather.

Our usual academic fare was enriched by the participation of Lionel Howard, Bell Communications Research, and Ginny Redish, Director of the Document Design Center.

A characteristic of the 1985 meeting was a reaching out to other fields and other organizations. In our second decade, we are a firmly established group with a specific identity. We are ready to assist and be assisted by other groups and disciplines for our mutual benefit and for the general benefit of Technical Communication. The papers in this Proceedings, many of which discuss collaboration with other disciplines, with business and industry, and with research foundations, reflect the readiness to reach out that will characterize CPTSC in its second decade.

Marilyn Schauer Samuels

Marilyn Schauer Samuels

Editor

6

TABLE OF CONTENTS

FROM THE PRESIDENT: CPTSC and "Quality"........................ vii

PROGRAM.. ix

PAPERS... 1

Problems in Designing Graduate Programs in Technical Communication.. 2
Carolyn R. Miller, North Carolina State University

Graduate Technical Writing Programs: Determining Audience Vs. Shaping It... 10
Kristin R. Woolever, Northeastern University

How "Technical" Should Our Technical Communication Students Be?.. 16
JoAnn T. Hackos, University of Colorado at Denver

A Practitioner's View of Technical Communication Education... 27
Lionel A. Howard, Jr., Bell Communications Research, Inc.

Industry and Education Working Together: The Use of Advisory Committees.. 32
Sherry Burgus Little, San Diego State University

Seeing Both the Silicon Forest and Its Trees: Achieving Currency in a Scientific-Technical Communications Program.... 41
E. Richard Kreighbaum/Robert E. Ryan/Patrick M. Kelley, Clark Community College

Who Are Our Students?... 45
Judith Kaufman, Eastern Washington University

An English Major for Professional Writers.................... 48
Scott P. Sanders, University of New Mexico

Technical Communication and Engineering Technology: New Programs Developing Together................................ 63
Maria Curro Kreppel, University of Cincinnati

Finding Jobs for Technical Writing Students................. 70
Sally A. Jacobsen, Northern Kentucky University

Is There Funding for Individual and Group Research in Technical Communication?................................... 87
Marilyn Schauer Samuels, Case Western Reserve University

The Challenges of Consensus Theory in Modern Rhetoric for Teaching Technical Writing.................................... 93
Daniel R. Jones, University of Central Florida

Teaching Collaborative Technical Writing Projects............ 104
Gloria Jaffe, University of Central Florida

The Place of "Media Literacy" in the Technical Communication Curriculum.. 112
Sam C. Geonetta, University of Missouri-Rolla

Visual Rhetoric in Technical Communication: 1.Theoretical, Empirical, and Intuitive Bases; 2. The Impact of the Computer 138
Ben F. Barton/Marthalee S. Barton, University of Michigan

Approaches to Theories of Grammar: An Unexamined Chapter in Technical Writing Texts.................................... 167
Mary B. Coney, University of Washington

Technical Writing and the Vulgate............................ 177
Edgar S. Laird, Southwest Texas State University

The De Linguae Latinae of Lorenzo Valla and the Teaching of Technical Writing.. 184
Lawrence J. Johnson, University of Texas, El Paso

English Literature and Technical Writing Courses Both Contain Humane Content..................................... 196
Joseph C. Mancuso, North Texas State University/Anita Ross, Panda Educational Software

ANNUAL BUSINESS MEETING.. 205

Participants in 1985.. 206

Secretary's Minutes for 1985................................ 208

Treasurer's Report for 1984-5............................... 209

APPENDICES.. 210

Appendix A: Constitution.................................... 211

Appendix B: Annual Meetings, Sites, and Dates............... 215

Appendix C: Executive Committee and Institutions Represented by Current Members............................. 216

Appendix D: Members in 1985................................. 217

Appendix E: Table of Contents, CPTSC Proceedings, 1974-1984. 223

FROM THE PRESIDENT

Indulge me, please, while I quote myself: "Quality will be the watchword of the Council at present--and probably into the future."

Last year in these pages in Proceedings 1984, I cited the success of the Council at achieving its five constitutional purposes:

1. to promote programs in technical and scientific communication;
2. to promote research in technical and scientific communication;
3. to develop opportunities for the exchange of ideas and information concerning programs, research, and career opportunities in technical and scientific communication;
4. to assist in the development of new programs in technical and scientific communication;
5. to promote the exchange of information between the organization and interested parties.

Then I urged us toward a new purpose:

> Beyond the five purposes of the Council is another purpose: a purpose that is increasingly apparent now that programs in technical and scientific communication exist in quantity. This purpose is the promotion of quality in our programs.

Likewise, in a keynote paper in Proceedings 1984, Thomas E. Pearsall, the founder and the first president of the Council, urged us "to build quality programs." I need not ask your indulgence while I quote him at length on the lack of quality in a new program:

> Recently I was asked to evaluate a new program in our field. It was a disheartening experience. The people behind the program were good people with great potential. But they had come to communication, primarily from literature, only lately--as their students in literature had drifted away. Except for some consulting, they had little experience in the field. None belonged to organizations such as STC or the American Business Communication Association. Most did not even belong to NCTE or the 4 C's, the two organizations to which most English teachers interested in composition and communication gravitate. None had published in the field. None seemed to have a clear idea

> of what a career in business or technical communication really entailed. In addition their library holdings were inadequate in communication, and their administration had no notion of what was involved. The administrators seemed to think that attendance at a few professional meetings might provide the knowledge needed for a successful program.

After Pearsall and I wrote of quality in Proceedings 1984, he and I edited with our colleagues from STC--Roger E. Masse of Pacific Telecom, Inc., and Frances J. Sullivan of Eastman Kodak Company--the new third edition of Academic Programs in Technical Communication, a cooperative effort by STC and CPTSC that was published this year. Editing Academic Programs has increased the urgency of my appeal for us to promote quality in our programs.

Quantity, we have achieved. In 1976, the first edition of Academic Programs in Technical Communication included 19 institutions with programs. In 1981, the second edition included 28 institutions with programs. And in 1985, the third edition included 56 institutions with programs. Thus, the number of institutions with degree and certificate programs in technical and scientific communication almost tripled between 1976 and 1985; and it doubled between 1981 and 1985.

Quality, we have not achieved yet. In too many cases, evaluating the programs in the third edition of Academic Programs in Technical Communication would be "a disheartening experience."

The theme of our 13th Annual Meeting at Clark College in Portland, Oregon/Vancouver, Washington, in 1986 will be "Quality in Programs in Technical and Scientific Communication." "Quality," as I said, "will be the watchword of the Council at present--and probably into the future."

Patrick M. Kelley

Patrick M. Kelley
President

PROGRAM

Twelfth Annual Meeting
of
The Council for Programs in Technical and Scientific Communication

Miami University
Oxford, Ohio
13-15 February 1985

Wednesday, 13 February

8:00 p.m.	WELCOMING RECEPTION— WINE AND SNACKS

Thursday, 14 February

8:00 a.m.	BUFFET BREAKFAST
9:00 a.m.	"Designing Programs in Technical Communication" Ginny Redish, Document Design Center
9:45 a.m.	Questions and Response
10:00 a.m.	"Problems in Designing Graduate Programs(and Some Solutions)" Carolyn R. Miller, North Carolina State University
10:15 a.m.	"Graduate Technical Writing Programs: Determining Audience Vs. Shaping It" Kristen Woolever, Northeastern University
10:30 a.m.	"How Technical Must a Technical Writer Be?" JoAnn T. Hackos, University of Colorado at Denver
10:45 a.m.	Questions and Response
11:00 a.m.	Refreshment Break
11:15 a.m.	"Industry and Education Working Together: The Use of Advisory Committees" Sherry Little, San Diego State University
11:30 a.m.	"Coping with the Growth of the Silicon Forest of the Northwest: Innovations and the Technical Writing Curriculum of Clark College" Robert Ryan, Clark College
11:45 a.m.	"Using the Problem-Solving Model to Unify a Technical Communication Program" Paul Anderson, Miami University
12:00 p.m.	Questions and Response

12:30 p.m. Lunch

1:30 p.m. "A Practitioner's View of Technical Communication Education"
Lionel Howard, Bell Communications Research

2:15 p.m. Questions and Response

2:30 p.m. "Who Are Our Students?"
Judith Kaufman, Eastern Washington University

2:45 p.m. "An English Curriculum for Professional Writers"
Scott Sanders, University of New Mexico

3:00 p.m. "Technical Communication and Engineering Technology: New Programs Developing Together"
Maria Kreppel, University of Cincinnati

3:15 p.m. Questions and Response

3:30 p.m. Refreshment Break

3:45 p.m. "Finding Jobs for Technical Writing Students"
Sally Jacobsen, Northern Kentucky University

4:00 p.m. "Internships: What to Ask From Students and Employers"
C. Glbert Storms

4:15 p.m. "Is Funding Available for Group and Individual Research in Technical Communication?"
Marilyn Schauer Samuels, Case Western Reserve University

4:30 p.m. Questions and Response

5:00 p.m. Wine and Cheese

5:30 p.m. Dinner at Marcum Center

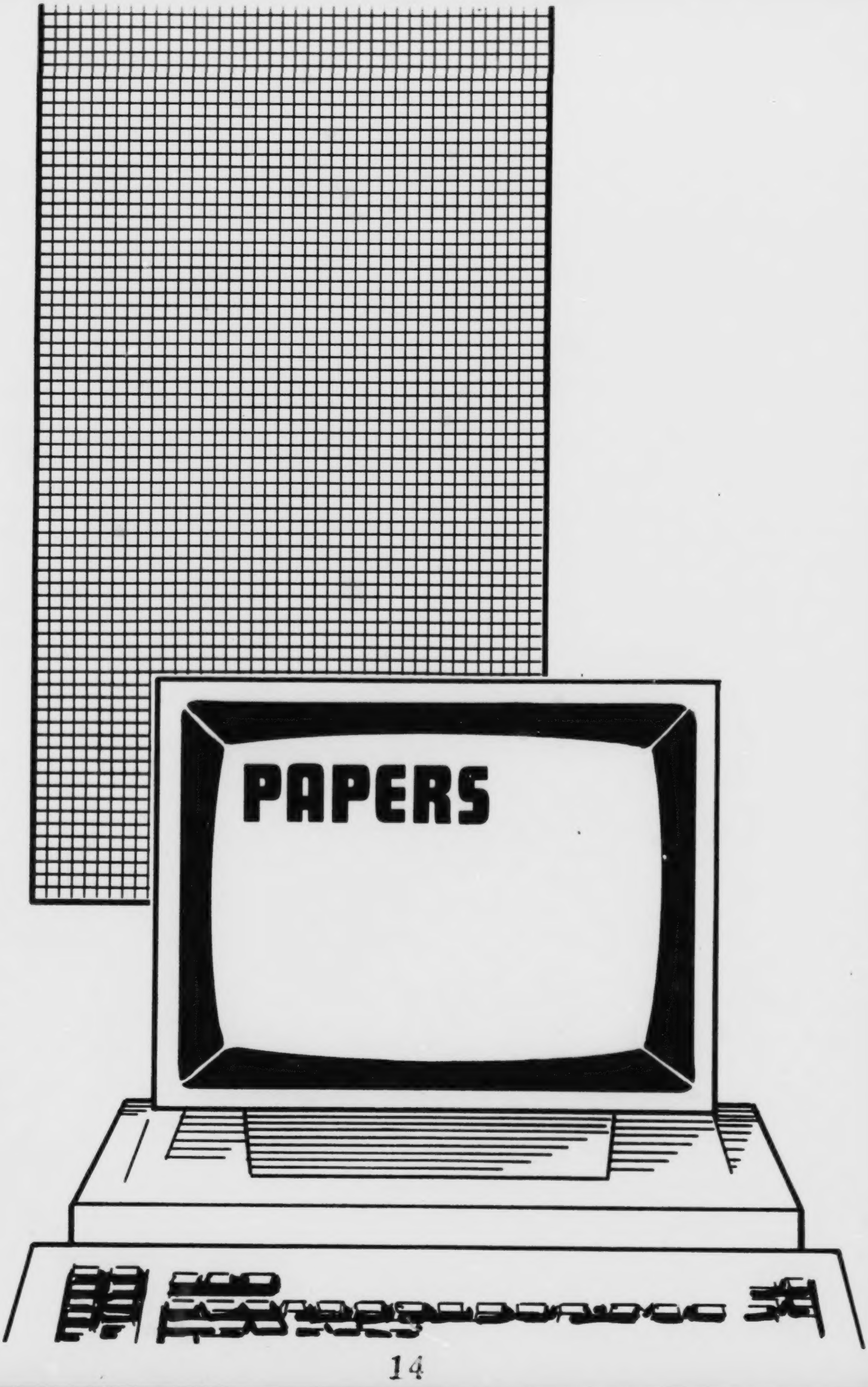
8:00 p.m. Informal Idea Exchange and Refreshments

FRIDAY, 15 FEBRUARY

8:00 a.m. Deluxe Continental Breakfast

9:00 a.m. "The Challenges of Consensus Theory in Modern Rhetoric for the Teaching of Technical Writing"
Dan Jones, University of Central Florida

9:15 a.m.	"Collaborative Technical Writing Projects" Gloria Jaffe, University of Central Florida
9:45 a.m.	Questions and Response
10:00 a.m.	"The Place of ´Media Literacy´ in the Technical Communication Curriculum" Sam Geonetta, University of Missouri, Rolla
10:15 a.m.	"Technical Writing and the Vulgate" Edgar Laird, Southwest Texas State University
10:30 a.m.	"Visual Rhetoric in Technical Communication: The Impact of the Computer" Ben Barton, University of Michigan
10:45 a.m.	"Visual Rhetoric in Technical Communication: Theoretical, Empirical, and Intuitive Bases" Marthalee Barton, University of Michigan
11:00 a.m.	Refreshment Break
11:15 a.m.	BUSINESS MEETING
12:30 p.m	Lunch
1:30 p.m.	"A Course in Technical Communication Designed by Communicators" Susan Feinberg, Illinois Institute of Technology
1:45 p.m.	"Approaches to Theories of Grammar: An Unexamined Chapter in Technical Writing Texts" Mary B. Coney, University of Washington
2:15 p.m.	"Lorenzo Valla´s *De elegantia linguae latinae* and the Teaching of Technical Writing" Lawrence Johnson, University of Texas, El Paso
2:45 p.m.	"On-Again, Off-Again Romance May Yet Be a Marriage" Joseph Mancuso, North Texas State University
3:00 p.m.	Questions and Response
3:15 p.m.	Adjournment


PAPERS

PROBLEMS IN DESIGNING GRADUATE PROGRAMS IN TECHNICAL COMMUNICATION (AND SOME SOLUTIONS)

CAROLYN R. MILLER
ASSOCIATE PROFESSOR OF ENGLISH
NORTH CAROLINA STATE UNIVERSITY

Early graduate programs in technical communication faced one major problem--getting off the ground at all. These programs tended to be conservative, to resemble existing undergraduate majors and minors or existing graduate degrees in the sponsoring departments. But now that graduate education in technical communication has become better accepted, program design should become a positive rather than a negative art. As a positive art, program design becomes more complex, more specific, and more challenging.

In this brief paper, I want to pose three problems that have become apparent to me as we consider beginning a master's program at North Carolina State University, to suggest some ways of solving or at least coping with those problems, and to present several program plans as institution-specific possibilities.

Problem 1. The first problem is, how can a coherent program be created without a traditional base in a single discipline? In technical communication there is no tradition of instruction at the graduate level, and this means that we have no canonized or cumulating body of knowledge. Technical communication is not a discipline, nor can it be understood as a subdiscipline of some other discipline. Rather, it is a set of related activities and phenomena that provide a locus for the methods and insights of many disciplines. As symbolic communication, technical communication can be studied in a variety of ways--historically, structurally, sociologically, aesthetically, philosophically, functionally. And, because like all symbolic communication, technical communication is situated, it can be, perhaps most importantly, studied in relationship to its distinctive contexts.

This fundamentally multidisciplinary nature of technical communication has political and strategic implications for program design, for it means that there is no institutional power base in a single department, of the sort that is often necessary to begin an academic curriculum. These problems need to be solved on an institution-specific basis depending on the local resources and power structures.

Problem 2. If we can accept as a principle of program design that a program in technical communication has two components, the technical and the communication components [1], then we need to address a second problem. How can genuinely graduate-level work in both components be guaranteed? In the communication component, can skills legitimately be taught at the graduate level? If we don't teach skills, will students be able to perform with any credibility in work situations? In the technical component, can graduate rigor be achieved in courses that often must address students with little or no prior technical education? Graduate-level work in technical communication should not, I believe, focus on the preparation of writers and editors--the nature of the profession is changing too fast. Rather, it should make some serious attempt to help students understand the effects of technology on communication and vice versa. They should for example, study some rigorous te cal approach to communication problems, such as technology trans , management information systems, or ergonomics. Bill Coggin's survey of STC members suggested that technical communicators need to be able to work with information from a variety of technical disciplines, so that general rather than specialized academic preparation in technical fields is preferable [2]. How can this be achieved, again at the graduate level?

The challenge is to achieve graduate-level rigor and depth and at the same time it assure the necessary competence in communication skills and the desired generality in technical knowledge. We can approach solutions through entrance requirements (to ensure basic levels of communication skills and perhaps some preliminary technical knowledge upon which the student may build). We can also search out or devise technical courses that emphasize methods and intellectual tools, problems and modes of thought, rather than specific disciplinary knowledge.

Problem 3. Another troublesome issue of program design is to find some happy combination of theory and practice. Often faculty press for theory and students and prospective employers press for practice. How do we distinguish between properly academic concerns and what should properly be on-the-job training? Graduate instruction in a professional program should not be irrelevant to the problems and situations of industry and government, but neither should it be slavishly mechanical. Graduate education should not follow the definitions and needs of prospective employers, it should lead, by graduating students who can contribute in new ways.

I have no real solutions to this problem. Students need both theory and practice and also experience in applying the former to the latter. Ways to balance these demands in the curriculum include entrance requirements, internships, mini-courses or other ways of compressing instruction in practical skill, a careful attention to theoretical instruction to ensure its fruitfulness and generalizability, and the use of well-chosen industry advisory boards to ascertain what the real social needs are without being restricted to the needs of particular corporations.

A Case Example. At North Carolina State University, our discussions of possible master's programs have touched on all three of these problems. I can't yet offer a program designed to respond adequately to all of them. To provide a theoretical rationale for what general coverage ought to be available in the program, I went to Roman Jakobson's and Dell Hymes' models of the factors in symbolic communication and tried to derive areas in which coursework ought to be included. You see the result in Figure 1. A curriculum based loosely on this list and drawing on specific coursework available on campus is shown in Figure 2.

We encountered problems like those I described above in Problem (1) because this program requires only three courses in English, the sponsoring department. The multidisciplinary design left the program without a real power base or advocates. An alternative model, presented in Figure 3, adds one English course and readjusts the balance between communication and technical components. Adjustments are continuing. I present these models only to exemplify some of the ways the problems I discussed have manifested themselves in one institution.

Obviously, more than these armchair exercises will be necessary to design a program that faculty, students, and employers will find both academically defensible and relevant to practical problems. I will be doing additional investigation on the relationships between industry and the academy in curriculum design for a 1985 MLA session sponsored by the MLA Committee on Academic Freedom, and I hope there to be able to report on some additional ways of viewing this particular problem and ways that professional programs in other fields have handled it.

References

[1] See William O. Coggin, "Educating the Communicator as Communicator in a Four-Year School," ITCC Proceedings, Pittsburgh, 1981, pp. E-11-13; and "Academic Technical Communication Programs: Meeting Changing Demands," ITCC Proceedings, St. Louis, 1983, pp. RET-21-23. See also Coggin's "The Technical Component of Degree Programs," CPTSC Proceedings, Univ. of Washington, Seattle, 1981, pp. 72-86.

[2] Bill Coggin, "Better Educational Programs for Students of Technical Communication," Technical Communication, 27 (2nd quarter, 1980), 13-17.

RATIONALE FOR GRADUATE PROGRAM DESIGN IN TECHNICAL COMMUNICATON
Based on Jakobson/Hymes Model of Factors in Symbolic Communication

Communication Component

sender/receiver	reading and writing as psychological processes nature and theory of human communication
channel	communication media: textual, electronic, visual
code	nature and theory of language
setting	organizational communication science and technology as rhetorical enterprises

Technical Component

message	computerized methods of handling information statistical methods of handling information statistical methods of evaluating effectiveness
topic	human/machine interfaces legal, ethical, commercial aspects of technical information management information systems technology assessment technology transfer
setting	scientific method management and administration history of science philosophy of science/technology government policy on science and technology

FIGURE 1

MASTER OF SCIENCE IN TECHNICAL COMMUNICATION (39 credits)

communication component (18 credits)	Required English Courses (9 credits) Structure of Modern English/Linguistic Theory Rhetoric of Science and Technology Advanced Technical Writing and Editing Required Interdisciplinary Courses (15 credits) Theory of Human Communication Behavior (Sociology) Organization Theory (Public Administration) Cognitive Processes (Psychology)
technical component (18 credits)	Intro. to Management Information Systems (Computer Sci.) Statistics for Behavioral Sciences (Statistics) Elective Minor (12 credits) Media Management Communication Computer and Information Systems Organizational Psychology Environmental Communication Medical Communication
	Internship and Thesis (3 credits)

FIGURE 2

ALTERNATIVE MODEL FOR M.S. PROGRAM (36 credits)

communication component (24 credits)

English Courses (12 credits)
- Advanced Technical Writing and Editing
- Rhetoric of Science and Technology
- Linguistics
- Discourse Theory (Semiotics, Rhetoric, or Composition)

Interdisciplinary Communication Courses (12 credits)
- Cognitive psychology
- Media--publication design or electronic media
- Organizations--selection from 5 possible courses
- Communication--selection from 3 possible courses

---

technical component (9 credits)

Interdisciplinary Technical Courses (9 credits)

- Computer Science--one required

two required:
- Management
- History of Science
- Statistics
- Human Factors
- Patents, Trademarks, Copyrights
- Computer Science

Internship and Thesis (3 credits)

FIGURE 3

"GRADUATE TECH WRITING PROGRAMS: DETERMINING AUDIENCE V. SHAPING IT."

KRISTIN R. WOOLEVER
PROFESSOR OF ENGLISH
NORTHEASTERN UNIVERSITY

Since industry's demand for technical writers has never been greater, many universities are responding by developing graduate programs to meet the need. The 1984 Fourth Quarter edition of Technical Communication attests to this trend by listing several new Master's programs already in place. But there is a problem educators in these new programs should foresee. Curriculum developers need to recognize how their programs depend on industry to dictate the content of their technical communication courses, and how the work that goes on in their classrooms can shape industry's attitudes toward technical writing.

Communicating in the workplace is most often an exercise in problem-solving. As one of my graduate students recently suggested, finding answers is a lot easier if you ask the right questions. At Northeastern University, we've recognized the potential problem with our technical writing programs, and are trying to formulate the right questions to best solve the dilemma.

The major question is one of audience. As you know, a technical writer's first impulse is to analyze audience. That's essential for on-the-job communicators and well-recognized by both tech writing teachers and tech publications department managers. (Some examples:

Pat Caernarven-Smith's book on Audience Analysis, J. C. Mathes and Dwight Stevenson's Designing Technical Reports: Writing for Audiences in Organizations, and Thomas Pearsall's extensive work in this area as well.)

As educators, we sometimes confuse this issue of audience. We really have a multiple audience problem:

- students - who want to find good jobs in industry.
- industry - who want writers to jump right in to specific applications with little training.
- community of scholars who are concerned with tech writing as an "applied" intellectual activity.

The danger for academe is to pay most attention to industry as the "market" for our programs. If industry--for example, the computer industry in Boston--is our primary target audience, the placement of our graduates becomes paramount. To best place all the students, permitting us to claim 100% success rate for the curriculum and thus lure next year's crop of students, we let industry's needs determine what we teach. For instance, two new trends in writing for the computer industry are on-line documentation and video sequences. The local industry wants students trained to condense instructions to little on-screen nuggets and to design animation. Some industry prophets agree that hard-copy books will be a thing of the past--and some even go so far as to say the future is in pictures, not words. Whether or not that will happen is debatable, but Northeastern will not give in to that industry pressure. Northeastern is not planning to permit students to graduate from our programs without understanding the writing process from a variety of perspectives.

In order to solve communication problems, writers need more than situationally specific tools. Technology moves too fast to permit one-dimensional success. But as Paul Anderson notes in the "Introduction" to Technical Communication (Fourth quarter 1984):

> "Immersed in a world that demands that they produce effective communications at a steady and rapid pace for their employers, practioners place high value on knowledge that is immediately useful in the *particular* situation that faces them right now. In contrast, educators belong to the community of scholars, which honors for its own sake (and rightly so) the creation of new knowledge (including theoretical knowledge) that contributes to the *general* understanding; such knowledge is valued even if its practical application isn't immediately evident."

Ironically, high tech employers--to continue the Boston example--understand the ramifications of this problem as it similarly occurs with computer language. All of the representatives from industry who reviewed our new Master's program in its developmental stages were pleased to note that we require Pascal as the high level computer language, and leave the more application-specific COBOL, FORTRAN, etc. as electives. Such a philosophy makes sense to industry because it doesn't lock an employee into a specific task. Pascal permits the students to understand general high level computer language concepts, without locking them into business or engineering applications. The irony here is obvious.

PROGRAMS:

At Northeastern University, we have tried to answer the question of "who is our real audience?" with a two-pronged solution. Since our major local business is computers, we have established the Technical Writing Certificate Program specifically to prepare writers for the software industry. Our primary audience here is industry, and we permit--to a great extent--local high tech firms to influence course content. This graduate program runs for 9 months, three evenings per week, and the students are career-changers whose main goal is to find computer-related writing jobs. The program emphasizes computer skills, writing/editing, graphic design, print production and oral presentational skills. In addition, we spend a lot of time with the "how-to's" of job seeking: resume-writing, professional portfolio preparation, interviewing skills, and so on. However, each student must also submit three major projects, one per quarter, giving them breadth in their understanding of writing: first quarter--User's Manual, second quarter--Computer Concept Paper/ Trend Analysis, third quarter an Independent Documentation Project specifically designed for the workplace. This four-year old program is team-taught by technical writing department managers and English Department tech writing faculty. And, yes, we've had 100% placement each of the 4 years.

This is the first year for our new Master's of Technical and Professional Writing--the other "prong" of our solution. This successful program has doubled the number of English department graduate students already, and promises to continue growing if the stacks of applications for next year are any indicator. The Master's curriculum combines theory and practice to prepare students to write in the immediate situations they find on the job, and to help shape industry's concept of writing since these graduates will understand the larger concerns of technical communication as a discipline. Unlike the Certificate Program, this degree encompasses all types of professional writers, from medical writers, to lawyers, to psychologists, as well as the predictable number of computer documentation people. All courses meet at night, allowing students who work full-time to attend. Basic Requirements for the program are:

- three core writing and editing courses
- one high level computer language (Pascal preferred)
- three courses in professional sequence (management, graphics, cognitive psychology, computer science, etc.)
- internships
- final documentation project

Some examples of courses from the English Department include "Technical Writing Theory and Practice," "Proposal Writing," "Technical and Scientific Editing," and "Publications Management."

We must be doing something right. One of the students is documentation manager at GENRAD Corp. and has been a technical writer for 20 years. Based on the writing theory he learned first quarter, he redesigned his entire department so that his writers could better solve the composing problems facing them.

This is an example of "shaping audience" instead of merely determining who it is. We're fortunate to have some management level people in our program, so the changes can occur more quickly. But the entry-level writers we send out to industry will eventually move through the ranks and become managers and project leaders. If we have educated these graduates in all levels of the communicating process, universities can play a major role in shaping the way industry handles writing, and our students won't be myopic--unable to see beyond the immediate applications.

A brief anecdote illustrates this "technical myopia." Michael McGough, associate editor of the Pittsburgh Post Gazette, reads hundreds of applications from recent graduates of journalism schools. While Mr. McGough is searching for reporters who can analyze situations and write about them insightfully, he notes with dismay that most of the resumes he sees emphasize the brand names of Video Display Terminals with which the applicant is familiar--a classic case of confusing the means with the end.

But universities can learn a lesson here. We don't want to send out our graduates emphasizing only the current industrial brand names. We can prevent this commercialized version of education by asking the right questions.

- Who is our read audience?
- What do they want to know now?
- And what do they need to know for the future?

HOW "TECHNICAL" SHOULD OUR TECHNICAL-COMMUNICATION STUDENTS BE?

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In designing graduate and undergraduate programs in technical communication, we must be concerned with the extent to which are students are competent to handle technical subject matter. While we may sometimes rest on the claim that many people hired today as technical communicators have no technical education or training, it should be our purpose to graduate students who are ahead of, not equal to or behind, the traditional practitioner. We have an obligation to our students to provide them with the best preparation possible to practice their craft in a variety of professional areas. While we can acknowledge the fact that technical communicators work in some industries that are less "technical" than others, we cannot add caveats to our students' degrees, branding some as low-tech and others as high-tech.

The problem of preparing students adequately for technical careers can be solved at the undergraduate level by requiring second degrees or substantial minors in a technical subject. At the graduate level, however, the problem becomes more difficult to solve. Most master's degree programs require between 30 and 40 hours of course work, allowing little opportunity for strong technical minors. Many students enter these programs with humanities or social science undergraduate degrees that required few if any courses in mathematics, science, or technology. And, universities, like the University of Colorado at Denver (UCD) where I direct the master of science program in technical communication, frequently will credit only graduate or upper-division courses toward graduate degrees.

How then are we to design our programs so that our graduate students will be prepared to enter the technical workplace? In this paper, I'd like to examine three kinds of solutions: 1) require that students enter the programs with technical degrees or technical training, 2) require that students take technical course work to satisfy an exit requirement, and 3) combine elements of the second solution with a variety of technical subject matter in the technical communication classes. But before I discuss these solutions, I want to clarify the problem further by reviewing the backgrounds of students in UCDs fledgling master's program and some of the difficulties they have with technical subject matter. Then, I want to discuss some observations I've made of hiring practices in technical corporations. Perhaps these observations of what some companies require of technical communicators will be helpful to others involved in designing graduate programs.

What preparation do students bring into the graduate program?

The UCDs master of science in technical communication degree has existed for only one year; however, the students probably do not differ greatly in their backgrounds from those who would be accepted into similar programs around the country. Of the students admitted to the initial class, approximately half have degrees in technical fields, e.g., geology, chemistry, environmental science, and engineering. The other half have a variety of undergraduate degrees, including English, history, philosophy, psychology, and languages. Approximately 80% of the students are working as writers or editors in technical companies, including IBM, Martin Marietta Aerospace, Coors, Digital Equipment Corporation, to list some of the better known ones. All these students are required to take the same set of core courses:

Introduction to Graduate Study in Communication
Technical Communication: Writing Workshop
Technical Communication: Editing Workshop
Rhetorical Theory
Graphic Communication

It is in the writing and editing workshops that the difficulty some students have with technical subjects emerges.

What problems do the students have with technical subjects?

Both the writing and editings workshops require that students tackle subject matter that technical communicators typically are asked to work with on the job. Four assignments in the writing workshop asked students to

1. write an operations and maintenance manual for a safety valve
2. research and rewrite an original report by a geological consultant on a mining project
3. rewrite for another audience a Bureau of Land Management report on a water project
4. rewrite for another audience a medical journal article

The students with technical degrees and experience had no difficulty dealing with the technical material of the assignments although they were not experienced in the specific areas. The students with humanities or social science degrees had great difficulty with the first two assignments. In fact, I chose less technically difficulty assignments for the remaining two because of the problems with the first two.

One might argue that technical communicators in the workplace would have technical experts to interview about the technical material. To compensate for this lack, I organized the class into study groups (four to five students to a group) to work on the assignments. Even though the study groups mixed both technically and nontechnically educated students so that the technical students could be a resource for those less technically proficient, many of the nontechnical students remained unable to understand the material in the assignments. During the study group meetings the technical students and I tried to explain the material many times and in many different ways with little success. I might point out that I had previously used the geological report with several classes of freshman engineering students at the Colorado School of Mines. They had little difficulty handling the technical content of the report.

To help them handle the assignments, I suggested that students lacking technical backgrounds read similar material. Several looked at basic guides on electricity and mechanical valves to help them understand the operations and maintenance manual assignment and consulted geology reports for the second assignment. While this background reading helped to some extent, they did not have sufficient time in the four weeks they worked on each of the first two assignments to learn enough to write a comprehensible and accurate manual and report.

These students also had difficulty understanding the source material provided with the assignments. They panicked in the geology assignment when they had to recalculate the cost estimates although the calculations required nothing more than arithmetic. Several were very reluctant to consult reference material to give themselves some background on the subject. Others dismissed the technical material as unimportant and simply reproduced from the source material whatever they could not understand.

The same problems occurred in the technical editing workshop when students were asked to edit a report on power-plant scrubbers, a manual on a microchip CAD system, an engineering soils report, and a report on a transportation-control system. The technically educated students were able to understand the subject matter while many of the nontechnical students could not. In the power-plant assignment, for example, many of the nontechnical students ignored the inconsistencies in the technical content.

What technical knowledge do employers require of our graduates?

In their article on the design of new manuals for the NASA astronaut-training program, Mary Fae McKay and her coauthors argue that "copy editors need to be encouraged to become technical editors." (1) In their presentation on the design project at the 32nd International Technical Communication Conference, McKay explained this comment further. She found that the contract editors working for NASA were content to correct the punctuation and grammar in the manuals while ignoring incredibly serious inconsistencies and omissions in the technical subject matter.

This same problem occurs with the students in the technical editing workshop. Their inexperience with technical information makes them reluctant to tackle or even identify technical-content problems. They're happy to perform simple copyediting but unwilling to change the technical author's organization or sentence structure even when they are poor. Do we ignore their difficulties in our classes, essentially leaving it to the potential employer to provide the technical experience? If we take this approach, we limit the job opportunities open to our students.

A number of Colorado corporations employing technical communicators require that job applicants have technical degrees. In fact, they prefer, like their counterparts around the country, to hire people with technical backgrounds and teach them to write a particular kind of document the company needs. For example, Hewlett Packard prefers to hire people with electrical engineering degrees to write operations and maintenance manuals. This employer feels that they cannot afford the time it would take to bring a person trained as a writer up to speed technically. Another Front Range firm frequently advertises for a technical writer with five year's experience who also has a helicopter pilot's licence and has repaired helicopters. The Postal Service wants mechanics and mechanical engineers to design and write manuals for its new computerized mailing machinery.

In light of such requirements, perhaps we should advise our students to dispense with technical communication degrees in favor of engineering degrees and helicopter maintenance training. Hiring practices of this sort imply that corporations do not recognize technical communication as a field in which someone must be educated and believe that writing is a relatively unimportant skill that anyone can learn. What corporations generally acquire through such hiring are "one-trick ponies," writers who learn to write a particular way for one type of document, who never question the effectiveness of the document's design, and who are often not interested in learning any more about writing than they need to produce documents acceptable to their technically trained supervisors.

Other corporations explicitly decide to hire people who have no technical background but have some interest in writing. These corporations argue that since the audiences for their manuals are not technically proficient, neither should their writers be technically proficient. In fact, as one writer told me proudly, these companies want to hire "idiots" to write for "idiots." Do we then graduate technical illiterates who can't tell a disk drive from a washing machine?

Both types of hiring practices imply that the writer must be like the audience in order to write effectively for that audience. One company hires technically trained people to write for technical audiences, while the other wants technically inexperienced people to write for more general and inexperienced audiences. Neither recognizes the importance of education and training in technical communication to the writer's job. It is the subject matter that counts.

Only the more enlightened corporations look for the kind of people we hope to graduate--individuals who combine skill in communicating and designing effective communication with sufficient technical education or experience to ensure that they can learn new technical material quickly. The question then comes back to my starting point. How do we, in our limited graduate programs, develop students with both abilities?

What can we do to prepare our students for technical careers?

To prepare our students for the technical career that is technical communication, we must begin by providing them with an understanding of what will be required of them on the job. They must acquire the ability to learn new technical information quickly and find information sources when necessary; talk intelligently with technical experts; evaluate, not simply accept without question, the information they receive from technical experts; understand the basic vocabularies of a variety of technical fields; and understand the thought processes and problem-solving techniques used by technically expert people. This list of abilities is certainly not exhaustive, but it implies that we must provide our students with experiences not ordinarily included in either technical communication classes or introductory level technical classes.

As one solution we can ask that our students combine technical degrees with degrees in technical communication, as some program designers have recommended. James Souther, in his description of the proposed master of science degree in technical communication at the University of Washington, proposes that incoming students be required to have either a bachelor's degree in engineering or 30 credit hours in basic science and mathematics, including calculus. (2) This program, housed in a college of engineering, would exclude most students with humanities or social science backgrounds unless they were willing to make up at least 30 hours of deficiences at the undergraduate level.

At the University of Colorado, we are attempting a compromise. For students who lack previous technical education or training, we require one course in computer science that includes programming and systems analysis. We also urge such students to take their nine hours of electives in a technical field. This requirement will mean, in many cases, that the student will have to take more than nine hours because of prerequisites. We usually cannot accept lower division undergraduate courses toward a graduate degree; only junior or senior level courses can be credited.

We can also require that students deal with difficult technical information in our writing and editing classes. Such a requirement will mean that the instructors must be able to handle the technical material if they are to respond adequately to the student's productions. Too often, I have found that technical writing instructors themselves ignore the technical content of assignments, the same problem we are trying to overcome in the students.

One final solution that I am anxious to try is to require that students take a introduction to statistics. The American Statistical Association along with the National Council of Teachers of Mathematics has proposed that students take a introductory statistics course. They suggest that such a course will help students learn about "familiar statistical concepts such as reading tables, the mean (average), and scatter plots . . . as well as less familiar ones such as the median, stem-and-leaf plots, box plots, and smoothing. All of these techniques are part of a new emphasis in statistics referred to as data analysis . . . The techniques . . . encourage students to ask questions and generate hypotheses about the data . . . an important part of data analysis." (3)

Through statistics, we may be able to help students understand the nature of mathematical, and thus much technical and scientific, reasoning. They will learn to evaluate data rather than simply accept its existence. They may even learn to notice in a text they are editing that the chemical formulas do not balance or the measurements are off by several orders of magnitude. If they learn such judgment, they will have come a long way toward becoming the kind of technical communicators who will feel they can tackle any new technical material and succeed in learning much about its meaning and intent.

In his article on "Field Paradigms," Richard Watson identified what he calls a "cross-over" effect among some technical writers. Such writers began their educations in a technical field but crossed over out of interest to a less technical field such as English. Watson argues that such a writer is able to handle both the writing and the technical thinking involved in effective technical communication. (4) My suggestions here are designed to help new technical communicators experience the cross-over effect. I hope that through immersion in technical material in their writing and editing courses and through a carefully selected group of technical courses, including statistics, they will become technically literate. The experience students will gain through course work of this sort, in addition to basic intellectual curiosity, should enable them to function well as communicators in any number of technical disciplines.

FOOTNOTES

(1) Mary Fae McKay, Andy Petro, Roy J. Magin, and Judith A. Resnik, "High-Flying Training Manuals," Proceedings of the 32nd International Technical Communication Conference (Houston, Texas: Society for Technical Communication, 1985), p. VC44.

(2) James W. Souther, "A Graduate Studies Proposal," Proceedings of the Council for Programs in Technical and Scientific Communication (Santa Fe, New Mexico: Council for Programs in Technical and Scientific Communication, 1984), pp. 20-26.

(3) James M. Landwehr and Ann E. Watkins, Exploring Data (Draft document prepared for the American Statistical Association--National Council of Teachers of Mathematics Joint Committee on the Curriculum in Statistics and Probability, 1983), p. i.

(4) Richard Watson, "Field-Paradigms: The Relation between the Technical Communicator and the Technical Team," Proceedings of the Council for Programs in Technical and Scientific Communication (Santa Fe, New Mexico: Council for Programs in Technical and Scientific Communication, 1984), pp. 159-179.

A PRACTITIONER'S VIEW OF TECHNICAL COMMUNICATION EDUCATION

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I welcome the opportunity to attend the annual meeting of the Council for Programs in Technical and Scientific Communication, especially because you represent the leadership of a small but tenacious group that is dedicated to the improvement of education in our field. I hasten to add that I am here to learn, not to instruct.

During the last few months, I've been catching up with my reading. I went through the August 1984 issue of IEEE Transactions on Education, which was also published as the September issue of IEEE Transactions on Professional Communication. Then I read the fourth-quarter issue of Technical Communication. I came away from these with renewed confidence in the knowledge, perceptiveness, and dedication of the academic professionals in technical communication. A vast amount of expertise and good sense has been encapsulated in such articles as those by Paul Anderson, C. Gilbert Storms, Thomas Pearsall, Jone Goldstein, Carolyn Miller, Jack Selzer, and Marcus Green and Timothy Nolan. I read somewhere about the creative tension between educators and practitioners in our field -- about the practitioner's concern for the particular and the educator's concern for the general. And I think that the more the practitioners listen to you, the more convinced they'll become that good minds are at work in the teaching of technical and scientific communication.

So I have no advice to give you about how to teach, nor can I imagine how a practitioner can offer you any worthwhile suggestions. Instead, I'd like to tell you about our efforts to orient and educate our editors and then I'd like to mention some problems.

About five years ago I had a large group of new editors starting work within a two-week period. There were about 15 editors in the group, all hired directly from the campus. Many of them had been undergraduate majors in Technical Communication; several had received master's degrees in the field. On the whole, the group ranked high in academic achievement.

For orientation, we gave the new editors an intensive eight-day program of lectures, discussion, and show-and-tell, introducing them to the kinds of documentation we produced and the writing/editing/publication process. We had special sessions on readability, comprehensibility, and design and graphics peculiar to our documentation. A company knows that it may have to provide this kind of program. We cannot expect a college to familiarize its students with the idiosyncrasies of a particular industry or corporation. But we were dismayed at the lack of substantial course work taken by the new editors in science, mathematics, and computer science.

After the orientation sessions, the new editors took an intensive course in electronics and special instruction in our computer operating system. Then, they were assigned to senior writers who became their mentors during a six-month apprenticeship.

The new writers quickly learned a great deal about our procedures and our expectations. They learned how to work on documents and whom to call when they had questions. The mentor system provided excellent guidance, and it told us how we could improve the learning process for new writers. We used the mentor system again in the two succeeding years. Obviously, we had to have enough good writers to go around, and we needed a special kind of writer to run the entire program. Fortunately, we had these people.

All this effort to properly orient new writers is just one aspect of education in our day-to-day operations. Hundreds of specialized courses in physics, electronics, telecommunications, mathematics, computer science, the behavioral sciences, and management are offered on the job and both during and after work hours. So we appreciate the special role of educators in every discipline. It is essential to our well-being and effectiveness to be education-minded.

It's also essential that we not become satisfied with the status quo in our profession. Perhaps you can throw light on a few professional problems in the work place. Let me tick them off quickly.

1. We have a shortage of highly skilled technical communicators, and the shortage will probably continue for a long time in spite of improved salary opportunities. I'm surprised that the attraction of high salaries doesn't seem to increase the available pool of really outstanding candidates for entry-level positions. Rightly or wrongly, I attribute this to the perceived undesirability of the work itself and to relatively low standards of admission and retention for students majoring in our field. I realize that there are some compromises that a college sometimes makes

in permitting borderline admissions. This is an issue with which you must have your moment of truth.

2. I'm also discouraged by the rate of turnover among editors/writers. We seem to lose the very bright writers fast. But we also lose better-than-average writers, many of whom seem to have opted for different careers. I take a dim view of the prospects for a profession that loses its best and brightest within a few seasons.

3. As for the ability of new writers to edit and write, I have one major dissatisfaction. A large number of seemingly well-educated writers appear to have a great deal of difficulty with grammar, usage, and diction. One thing is certain: no one seems to be graduating any syntax mavens or word mavens. And I've been told that the situation may be even worse than I suspect it is, since so many editors don't know where to look for the answers to grammar or diction problems. What can we do? We've tried offering compulsory refresher courses. Did they help? Only for a little while. It's possible, of course, that some documentation managers do not demand a scrupulous concern for language and its uses -- in which case mediocrity breeds mediocrity.

4. I realize that many of you include internship in your curricula. At the present time, my company does not have a formal internship program for bachelor's or master's candidates in our field. So far, I'm not convinced that internships are essential to a good undergraduate or graduate program in the field. Nor am I convinced that corporations that sponsor interns get their money's worth. Recently, I read an excellent article dealing with the content of a master's program, but no where in the

article did I see evidence justifying the internship. Can you make a good case?

Let me leave with you a question that is more important: Why is it that so many young writers and editors do not seem especially motivated to continue their studies on the graduate level? Is this a reflection on the quality of graduate programs in general? Or is it possible that in their college studies the young editors were not persuaded about the lifelong importance of continuing education, particularly in relation to a career in technical communication? Perhaps it's time for a fresh look at our standards and expectations. If it is, I am sure that an organization such as yours is ideally suited to doing the job with intellectual regor and extraordinary forthrightness.

INDUSTRY AND EDUCATION WORKING TOGETHER: THE USE OF ADVISORY COMMITTEES

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Industry's increasing demand for people skilled in technical and scientific writing has resulted in the last five years in an increasing number of programs being developed nationally by institutions of higher education to educate students for this profession. For example, a certificate program in technical and scientific writing has been offered by San Diego State University since May 1982. Students who have completed this program are being employed by such firms as General Dynamics/Convair, Cubic Corporation, American Computer, Inc., Burroughs, Great American Federal Savings and Loan, Hewlett-Packard, San Diego Gas and Electric, and Harcourt Brace. Other programs are being rapidly developed across the nation.

A program designed with such a focus demands that education and industry work together in developing the program to ensure that it truly reflects what industry needs and provides students with the required knowledge to enter the profession of technical communication. The advantages of such cooperation to both education and industry are obvious and numerous, but how to achieve such cooperation is not always so obvious or easy. One historically successful and established method of achieving this collaboration is the use of industrial advisory committees in developing and maintaining technical writing education programs.

ADVANTAGES OF ADVISORY COMMITTEES

In involving industry in developing educational programs, education enjoys many advantages. The biggest advantage is that the program is planned with industrial input about what the prospective employer needs and wants. And once established, the program is offered by the committee a form of continual evaluation and updating so that it can keep abreast of technological changes. It assures the highest degree of realism in the educating of future employees. The feedback provided by the committee about the students from the program that they hire and the quality of the students' education helps identify problems and propose improvements to make programs more successful, assuring that students can, indeed, make the transition from school into the real world of work.

Industrial committees can offer facilities, equipment, and multi-media materials. They provide and help to develop avenues of employment and internships for students. The committee itself is a source of able and experienced people from business and industry for instructor positions or guest speakers, and their involvement helps publicize the program and secure community cooperation and support.

Industry benefits, too, from this collaboration; however, in my experience I have never had to convince anyone that it is to his or her advantage to work together with education in developing programs to educate future employees. In fact, most industrial people are delighted to be asked for their advice and are eager participants in such activities. In most, there is a strong commitment to their profession and serving on an advisory committee allows them an outlet for this commitment, a commitment that they take seriously. Especially in the growing field of technical communication, they see immediately the advantage of having a pool of trained and skilled workers available as potential employees, writers trained in a program that they themselves haved help form.

ESTABLISHING ADVISORY COMMITTEES

Despite the advantages, there are problems that must be addressed in establishing a successful advisory committee. These include achieving broad representation, determining operating procedures, and orientating members to academic environments.

Achieving Broad Representation

First is determining who will serve on the advisory committee. If you have done your homework well, you should have many potential candidates. From preliminary research, industries using technical writers can be identified. Needs assessments will determine the job market and the skills required by local industries. Active participation in professional organizations broaden the number of industrial contacts that educators know. For example, for the program at San Diego State University, the local professional Society for Technical Communication and its Education Committee were involved.

Selecting the members invited to participate in advisory committees demands careful screening. Technical communication covers a broad field and the representation on the committee must reflect this breadth in the field. A technical writer, in San Diego county at least, can be called a job analyst or a procedural analyst and work in a savings and loan, or called a documentation specialist and work in a computer manufacturing business, or called an engineering specialist and work in an aerospace industry under contract to the Department of Defense, or called a contract specialist writing proposals for electronic components or grants for research and development projects. And the list could go on. Achieving broad representation is essential; yet considering where the largest percentage of jobs are, too, must be considered in selecting members of advisory committees. The composition of the advisory committee should represent a realistic balance that reflects the job market.

This principle applies to the organizational level of committee members, too. The committee established at San Diego State University has as members managers as well as workers, longtime employees as well as those recently hired. Sometimes managers forget skills that beginning employees regard as significant, or because of their own expertise gained over the years, assume skills that less experienced writers have not yet acquired. It is important that whatever level of the organizational structure the members represent, they have support from their companies so that they can get time off to attend meetings if they are scheduled during the work week. Some committees meet at night to resolve this problem.

Important, too, are the personal qualities of the members selected. They must be people who can work together as a team. They must support education and believe in it. And they must be willing to serve, to devote volunteer time to what they believe is a serious endeavor. This does not mean that an advisory committee should be loaded with "yes-people." But all should be able to work together in the common cause of creating an educational program for educating technical communicators.

Another issue is the number of academic people on the committee. Because I believe an advisory committee should represent the industrial community and not the academic community, I keep academic representation limited. The focus is the advice given by industry in a climate that is free from the sometimes rarefied air of the academic debate. Although it is good public relations to have an academic representative present, preferably one who has the power to make decisions, the committee should be overwhelmingly industrial.

Determining Operating Procedures

Before inviting people to join an advisory committee, you should give some thought to several other issues. One question that many members ask is the length of service for committee members and how often the committee will meet. Although the committee can spend time at the beginning establishing its own procedures, the organizer of a committee should have some idea about its procedures. Some committees may not want to be bothered with working out by-laws or establishing the structure of the committee by answering such questions as Will officers be elected? How will votes be handled? Who will make up the agenda? Will minutes be taken, duplicated, and distributed? How often will the group meet and when and where? What about budget matters? Who will take care of such items as clerical duties and hospitality expenses? How formal should the meetings be?

I am not so sure that "correct" answers exist for these questions. Much depends on the committee itself. With my committee at San Diego State University, I went in with the idea that the structure should be a bit more formal than the committee decided it actually needed to be. I thought that business would be transacted more effectively with an elected chair and a secretary, with meetings following parliamentary rules of order. I soon discovered, however, that the committee preferred a looser, more informal structure. They wanted to dispense with the formalities of elections, for example, and get to work on the problem of designing a successful program.

Orienting Members to Academic Environment

Related to the lessons I learned from this experience is what happened at the advisory committee's first meeting. Most of the first meeting was taken up in orienting industrial people to the academic environment (and its bureacracy I might add). The few academic representatives at the first meeting needed orienting to industry's action-oriented approach as well, another good reason not to include large numbers of people representing academe on the committee. Nothing much else was accomplished at the first meeting other than discussing the role of an advisory group to advise and give suggestions and guidance. Following meetings emphasized that the no-nonsense approach of industrial people demanded structuring meetings with firm objectives. They met to get a job done and they wanted to get on with the job.

MAINTAINING CONTINUED ATTENDANCE

Industrial people are busy, as are we all. If they do not feel they are making important contributions, attendance at meetings will falter. Each meeting should have a firm goal to be achieved, and meetings should not be called if there is no firm purpose to meet. An advisory committee should not be formed if their expertise is not going to be truly used; people sense immediately if they are being used as figureheads. Meetings need to be highly organized, therefore, with pre-planning resolving any potential difficulties, such as conflicting schedules making it impossible to attend meetings. I thought I would share with you some of my experiences with these issues.

I have found that calling members about a month in advance of the meeting and following up with a letter assures good attendance. Other amenities are helpful, too. In the follow-up letters, I include the agenda and other information so that members can prepare themselves. I state exactly what it is the meeting should accomplish, making sure it is a true problem that needs to be resolved.

Members are always asked to contribute items to the agenda. In these letters, I also include information about parking, with maps and parking permits, which makes the University seem less formidable. At the meeting, needed materials are available: paper, pencils, ID tags, and coffee (even wine and cheese) create a good working environment.

Once the program is designed, what then? Should the committee continue as an on-going advisory group? Again, I'm not sure there are correct answers. Its continued existence can maintain a continual evaluation of the progress of the program, and their advice on changes will keep the program current. They are invaluable as sources of internship and employment opportunities for students and as strong supporters of the program. They are certainly a most important adjunct to the educational process of developing and maintaining the certificate program at San Diego State University, bridging the gap that frequently exists between school and the world of work. Without their strong support, I am certain the program would not be as successful as it has become. Certainly the many advantages of such a committee far outweigh the problems of initiating and maintaining its existence in a liberal arts environment that frequently aschews involving itself in occuptational pursuits. With the involvement of the industrial advisory committee comes the sense of "community," of what we have done.

SEEING BOTH THE SILICON FOREST AND ITS TREES:

Achieving Currency in a Scientific-Technical Communications Program

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The world of the technical writer has changed dramatically during the last two decades. These changes coincide with those toward higher technologies in the worldwide industrial complex. The Portland, Oregon-Vancouver, Washington metropolitan area is rapidly expanding into a "Silicon Forest" of high-technology industries that demand very specific education and experience. The increased use of robotics and computers in manufacturing and computers and word processors in offices points toward the demand for technical writers with more specialized technical background. Accordingly, Clark Community College intends to expand established applied science degrees to meet this demand.

In recognition of the demand for more specialized training for technical writers, we have established a research project the goal of which is to help us design degree programs that align themselves with the current demands of industry. Our achievement of currency will guarantee our students realistic vocational training to accompany their writing skills and at the same time make our advisement of students more effective in producing jobs for them.

The project in its preliminary phase involves a thorough search of the classified advertisements of the Portland metro-area newspaper, The Sunday Oregonian. Even though jobs placed in the classified ads represent only about 20 percent of the job market for technical writers, they indicate the education and experience that employers are looking for in new writers. One of our students records and charts each ad that concerns a job opening for a technical writer under specific vocational titles. "Software Documentation" and "Computer Hardware Users' Manuals" are examples.

For the purposes of this paper, the data cover the period from September 9, 1984, to May 15, 1985. Figure 1 represents these data. Each tree represents a major area of demand in the Silicon Forest.

As can be seen from the graph, the highest percent of jobs involves the computer industry. "Software Documentation" and "Computer Hardware Users' Manuals" accounted for 46 percent of the total. For the computer industry alone, the largest percentage was in "Software Documentation" at 57 percent of the jobs and "Computer Hardware Users' Manuals" at 43 percent. Even though only 46 percent were directly involved in the computer industry, almost without exception the other areas required at the least familiarity with computers and at the most specialized degrees in computer science, data processing, engineering, business, or some other specialty.

Until now, we only had one program to prepare students for transfer to four-year institutions or for entry-level positions in industry. By combining the findings of our research with consideration of the industrial make-up of our metro area, we have initiated some alternatives in applied science degrees.

THE TREES OF THE SILICON FOREST

Major areas of job openings for technical writers in The Sunday Oregonian by percentage of total

These jobs represent approximately 20% of all jobs for technical writers in our metro-area.

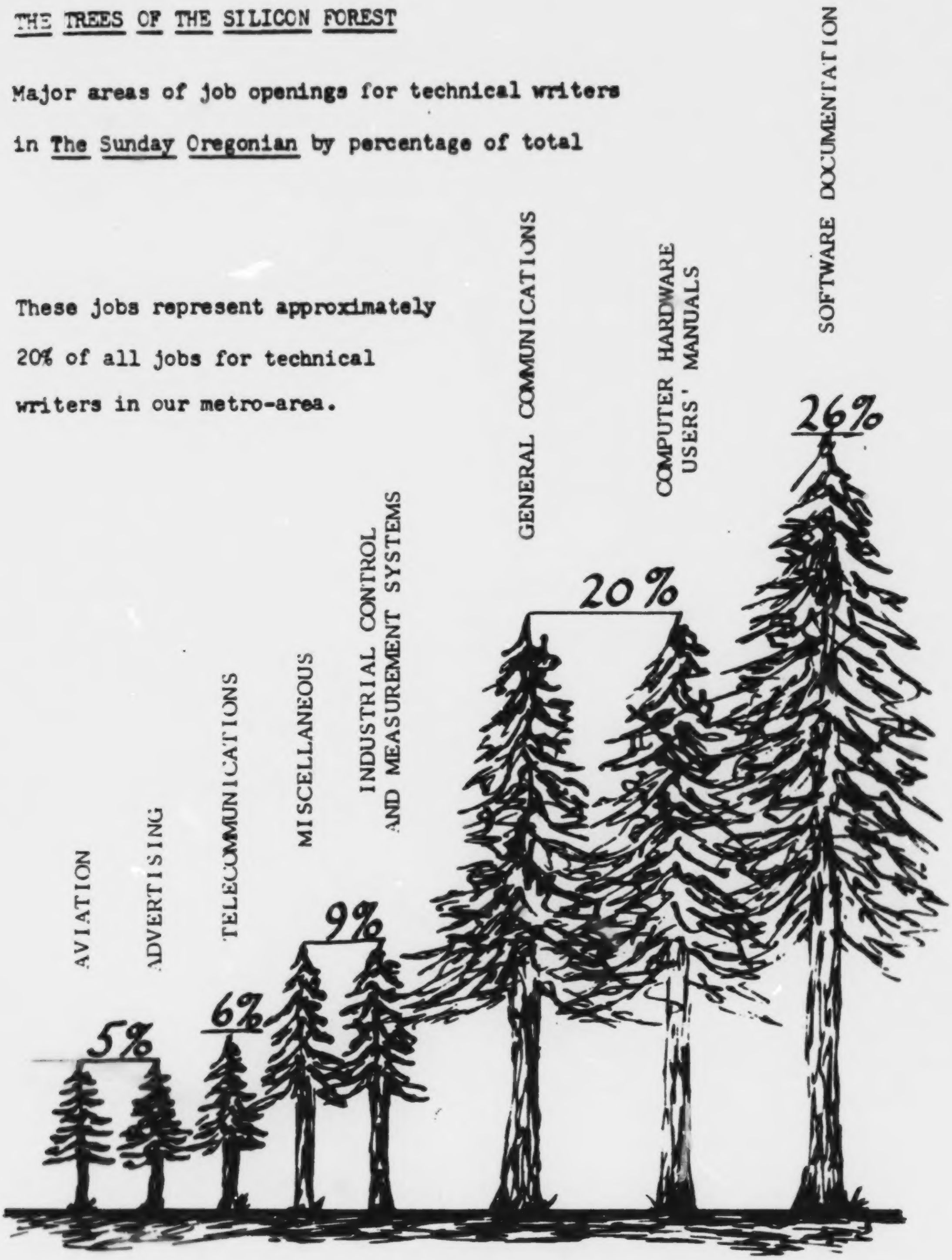

Figure 1.

The following program titles are indicative of the changes that we have initiated in our Scientific-Technical Communications (S-TC) program to help meet the demands of our local industries:

Computer Programming/S-TC

Data Processing/S-TC

Electronics Technology/S-TC

Telecommunications/S-TC

These programs and others that we will initiate as the demand dictates will keep our Scientific-Technical Communications program current with industry's demands for education and training and enable us to provide realistic vocational opportunities for our students.

WHO ARE OUR STUDENTS?

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In September 1984 Eastern Washington University (EWU) began a new interdisciplinary program leading to the degree of Master of Science in Communications. The program, under development for more than three years, combines the resources of nine departments from throughout the university: Applied Psychology, Communication Studies, Computer Science, Education, English (including Journalism), Management, Management Information Systems, Radio Television, and Technology. (The planning and development of the degree program have been described in past volumes of these Proceedings. See "Proposed Master of Science Degree in Communication Systems," Proceedings 1982, pp. 12-13; "Developing a Master of Science Degree in Communications," Proceedings 1984, pp. 42-48.)

In its first year of operation, the program has proved popular with students. Thirty degree candidates have been formally accepted into the program or are attending classes pending formal admission. This figure surpasses our enrollment projections, which assumed 20 students per year. But who are these students? Candidates for the Master of Science in Communications, in addition to meeting university requirements for admission to graduate school, must hold a bachelor's degree and have completed at least one year of successful work experience. With nine departments participating, students can enter the program from a wide range of academic and experiential backgrounds. It was therefore difficult for the program's planners to predict what the composition of the student body would be. In this paper I will attempt to fill that knowledge gap by analyzing the undergraduate majors and work experiences of our current group of students.

UNDERGRADUATE MAJORS

As expected, the students' undergraduate majors range widely, but they can be grouped into several categories, as indicated in Table 1.

Table 1. Undergraduate Majors of 30 Candidates for MS in Communications

Field	Number of Candidates
Communications/Media	12
Nursing/Dental Hygiene/Community Health	4
Business Administration	3
General Studies (interdisciplinary)	3
Economics/History/Political Science	2
Environmental Science/Wildlife	2
Philosophy	2
Education/Human Development	2

Table 1 shows that persons with undergraduate preparation in fields directly related to communications make up 40% of the student body (12/30). Of this group of twelve students, eight hold degrees in communication, two in journalism, one in radio television, and one in graphic communication. Given the name and orientation of the degree, this preponderance of communications majors is not unexpected. It should also be noted that Eastern Washington University does not offer a master's degree specifically in any of the four component fields of the communications/media group. In fact, among the disciplines participating in the Master of Science in Communications, only Communication Studies, Journalism, Radio Television, and the graphics section of Technology are without their own master's degree programs. (Graduate coursework in the Departments of Communication Studies, Radio Television, and Technology has been available under other interdisciplinary programs. The Technology Department also offers a Master of Education in Industrial Education. The English Department, to which Journalism officially belongs, offers several graduate degree programs, but the Journalism degree is only awarded at the baccalaureate level.) The distribution of undergraduate majors may thus reflect the structure of the university as much as the interests of the students.

WORK EXPERIENCE

The work experiences of the students entering the Master of Science in Communications are even more diverse than their academic backgrounds. However, several significant groupings may be discerned, as reported in Table 2.

Table 2. Work Experiences Shared by at Least 5 Degree Candidates

Field		Number of Candidates
Health Care		9
Patient Care (Nursing/Dental Hygiene)	- 7	
Administration	- 2	
Print and Broadcast Journalism		6
Management	- 4	
Reporting	- 2	
EWU Staff		6
Retail Sales and Management		5

That health care is the employment category shared by the largest number of students may reflect the increasing concern of the health care profession with effective communication between providers and patients. It should also be noted that the health care industry is a major employer in the region and thus provides employment for persons not wishing to make a career commitment to the field. Of the nine degree candidates with health care experience, six had been, or continue to be, employed in a professional capacity, while three had worked in support positions.

The EWU staff members who have been admitted to the degree program come largely from the student services area. They include two members of the residence hall staff and one admissions officer. The degree has also attracted two faculty members from the Department of Dental Hygiene, both of whom are also practicing dental hygienists.

FUTURE PLANS

Because the Master of Science in Communications is a two-year degree program, it is too early to assess the career directions of the current students. Many of them have expressed an interest in expanding their skills in their present professions, while others have entered the program with the goal of changing careers.

The program faculty and the outside advisory board are pleased with developments to date, but would like to attract more students from fields other than communications. We believe the program could be attractive to technical specialists (engineers, computer programmers) who find themselves moving into managerial positions that require enhanced communication skills. A recruiting effort is planned to make such persons aware of the degree and its professional benefits.

AN ENGLISH MAJOR FOR PROFESSIONAL WRITERS

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Over the last seven years, the English major at the University of New Mexico (UNM) has evolved from a single curriculum leading to the Bachelor of Arts degree to include several concentrations, each with its own curriculum, leading to a single BA in English. The traditional concentration prepares students for graduate study of literature. Other concentrations offered are pre-law, pre-business, teaching, and creative writing. The traditional concentration has the most graduates, followed by the creative writing and teaching concentrations, which regularly graduate many students. The pre-law and pre-business concentrations have only occasional graduates. Every year 65 to 75 students graduate with an English major at UNM, a university of 20,000 undergraduates.

I was hired last fall (1984) to oversee the creation of a new concentration in professional writing. Before I arrived, the Department had fought and resolved most of the battles over whether a major concentration curriculum that would emphasize the practical relevance of an English degree was appropriate. The Department wanted such a concentration. They knew this meant writing, but the exact content of the new curriculum was left to me to propose.

Before coming to UNM I had been at New Mexico Tech where I participated in designing Tech's Bachelor of Science in Technical Communication, which Jim Corey and I described at last year's CPTSC meeting. One point we made then about the Tech program was that although it is a completely new degree (in fact the only degree offered in the Humanities), it fits well with the existing curricula at Tech. Modeled after an engineering curriculum, the Tech BSTC degree has only fifteen hours of elective courses out of 134 and requires that students take the same calculus-based physics and chemistry courses and other lower division coursework that all Tech graduates complete. This very prescriptive curriculum is comfortable and familiar to Tech students, to Tech faculty, and to the employers who recruit Tech graduates.

Designing a new curriculum is an audience-analysis problem. The new program must distinguish itself by departing significantly from old programs, but at the same time it must feel as if it always should have been there. So my first task at UNM was to understand a new audience of students, colleagues in and out of the English Department, and potential employers, all of whom were interested for different reasons in the professional writing curriculum I would propose. The new curriculum needed to be comfortably an English, liberal arts major, and it also had to teach students explicit skills that would prepare them for recognizably professional employment upon graduation.

The new concentration accomplishes these goals. It also suggests a promising redefinition of both the traditional English curriculum and what is becoming the traditional technical writing curriculum. To explain this contention, first I will briefly describe the curriculum; then, following the theme of this year's conference, I will discuss the theoretical, empirical, and intuitive bases of its design.

The Professional Writing Curriculum

The professional writing curriculum at UNM does not simply overlay a traditional literature degree with a few courses in writing. It combines 12 hours of coursework in writing beyond the six required hours of freshman English with 21 hours of coursework in language and literature study. One hour of credit is granted for a required internship, completing the 34 hour degree. An outline of the curriculum is provided at the end of this paper, along with brief descriptions of the content of the courses specifically in professional writing.

Nine of the 12 hours of writing courses are upper division, which balances exactly with the nine upper division hours required in literature and criticism. The effect is to make the concentration similar to an English Honors curriculum for students whose special interests are in writing rather than in literature, and non-academic, professional employment rather than graduate school. This similarity is strongest in the internship and senior project requirements. Instead of an honors seminar and senior thesis, professional writing students undertake an internship and then a project that culminates in a written report of undergraduate thesis length and quality. The project report must also be presented orally in a manner similar to the public defense of an honors thesis.

The curriculum does not require English 219, the service course in technical writing. We decided it would not be wise, either from a pedagogical or curricular standpoint, to mix English majors preparing for careers as professional writers in the same class with engineers and business majors learning to write reports. 219 is required in the

18-hour professional writing minor, where its focus on applied skills is more appropriate for students electing a writing minor, who do so primarily to bolster their skills.

Technical writing and editing are only two of the many careers open to college graduates with strong writing skills. As a liberal arts program, our professional writing curriculum prepares students for a wider scope of potential professional employment that may be in business, media, law, industry, medicine, or government as public information or human resource managers, documentation supervisors, and other still more nebulously titled positions that primarily require expertise in writing. Courses in technical writing are part of the new program, but the program itself is a re-definition of the English major--not an expansion of the service curriculum in technical writing.

The Theoretical Basis

Our fundamental theory is that the English Department is the appropriate academic setting for a curriculum that promotes literacy as a generalized professional credential. Strong writers exhibit an analytic intelligence coupled with a synthetic, expressive power. Although this combination of intellectual abilities is fostered in all disciplines in the Humanities, in English departments the subject of inquiry is either the product of writing (a text), or the producer of writing (an author)--however variously they may be defined. I know that last sentence breezily subsumes nearly every issue ever discussed in literary theory. Allow me the simple truth of this sweeping generalization so that I can make my point: in English, more than in any other department in the university, the focus of inquiry is on writing. Our professional writing concentration takes this diffused focus on writing and makes it the explicit emphasis of the curriculum.

The process of writing itself, rather than the author or the textual product, is the primary object of students' study in the professional writing concentration. Our theory is that the critical reading of literature promotes writing and research skills, and the practice of writing skills encourages the critical reading of all types of writing. We contend that combining these activities with a basic knowledge of the structure of our language constitutes a rigorous preparation for a professional career based on proficient writing skills.

Of course, this contention is not new. That the traditional English literature curriculum, as it stands, is a decent preparation for a professional career has been argued in many articles (see Evans 1978 and Clayton 1981), pamphlets (Orange 1972; rev. 1979), and is the sole topic of Dorothy K. Bestor's well known book, Aside From Teaching English, What in the World Can You Do? (1977). Each of these authors answers the central question that Bestor acknowledges in her title by citing non-academic careers that English graduates have successfully pursued. However, they do not call for fundamental change in the traditional English literature curriculum.

Linwood E. Orange's pamphlet, English: The Pre-Professional Major, has the most impressive statistics. Orange surveyed "fifty-three law schools and thirty-seven medical schools . . . nearly four hundred industrial organizations of the 'blue chip' variety, and forty-three governmental agencies" (2). He discovered English majors working everywhere he looked, from aircraft industries to rubber manufacturers.

These former literature students held an equally broad variety of positions (see Orange, Table 2, p. 9). Orange's immediate point is important and utterly convincing: the jobs are there for English majors who will actively seek them.

But Orange's larger argument asserting the utility of the traditional English curriculum is not so convincing. Orange notes that some of the more successful job seekers had academic preparations quite different from the typical literature major's. He cites a "straight A 'double major' (English and Business Administration)" as "the most successful of these graduates," and also "several . . . graduates who included advanced composition, creative writing, and technical writing in their undergraduate curricula" (19) who found satisfying work as technical writers. Orange mentions these students and their atypical training in passing. He does not note that their experiences might indicate the need for some changes in the traditional English curriculum.

William H. Evans's article takes an historical approach, citing studies back to the 1930's to document first that the poor job market for college professors of English is not an aberration, and second that English majors have always entered careers outside of academe. Evans concludes by summarizing the advice of the authors he researched, asserting that their suggestions remain valid: "Stress at all times the practical skills of reading, writing, and speaking. Give practice, practice, practice in writing. . . . better information about alternative careers . . . . [and] participate actively in non-teaching internships" (205). But like Orange, Evans does not discuss the practical curricular problems that students would encounter as they tried to accomplish these goals within the confines of a traditional literature curriculum. He writes that the "B.A. in English is a viable degree, provided the student . . . adds non-English courses and work experience in a field in which that student has interests and skills" (204). The obvious question that Evans neither poses nor answers is: What is really viable, the English degree or the non-English coursework and work experience? And further, how do the skills learned in English study relate to the skills acquired from non-English study and work experience?

Two years later, John J. Clayton asserts that majoring in English "leads naturally to careers in many areas" (122) because students learn how to learn: "they . . . become creative, aware, critical learners" (123), which makes them "people who think for themselves, communicate well, and operate with a complex humanity," who are thereby "more competent in new learning, [and] better professionals in any field" (125). Such theorizing is attractive stuff for all humanists, but the practical recommendation that Clayton offers is little more than that English departments should provide better counseling for their majors about non-academic careers. He recommends against changing the traditional curriculum to include coursework that explicitly considers non-academic, career-oriented skills. But Clayton's argument, like Evans's, is seriously compromised when he admits that "one theme asserted itself again and again: the necessity for training outside English--through coursework, job experience, and advanced degrees" (130) [Clayton's emphasis]. Where is the true relevance for students who want a non-academic career? Is it in English study, or in the "training outside English"?

Our program directly addresses these questions by clearly identifying and emphasizing writing and language skills as the practical aspects of English study, by incorporating career counseling into the curriculum as part of the introductory course in the concentration, by requiring a nine-hour complement of upper division coursework in one or a combination of technical, professional, or scientific fields, and by requiring a non-teaching, preferably off-campus, internship. The integrative theory behind our curriculum is most evident in the three courses students take before beginning upper division work in the concentration.

Each student must complete English 240, "Traditional Grammar," English 250, "Analysis of Literature," and English 298, "Writing and the Professions" before enrolling in the upper division courses in the curriculum. In this context, 240 and 250 become parallel studies: the former introduces students to basic analytic techniques for working with sentences; the latter does the same for whole texts. 298 is the pivotal course in the curriculum. Its role is to articulate the theoretical foundation of the concentration in several ways. The course shows students how the techniques learned in 240 and 250 may be applied in the non-academic world of professional writing: copy editing uses some of the skills learned in 240; substantive editing, audience analysis, and working with rhetorical analysis uses some of the skills taught in 250. 298 also introduces students to the many careers open to professional writers. Students initiate their own career counseling as they research the importance of writing in different careers, and listen to and question guest speakers who visit the class to give presentations about their professional experiences.

The Empirical Basis

Of UNM's 65 to 75 graduates in English every year, perhaps twenty go off to graduate or professional schools and ten to fifteen become teachers in the public schools. The rest, the majority, simply go to work. And they do not, as some undergraduates and others cynically believe, pump gas, drive cabs, or brown buns at Burger King. The first empirical basis for any curriculum that claims to offer a "practical" choice must be to verify the existence of employment opportunities for its graduates.

As noted above, Orange's study documents a strong, nationwide job market for English graduates with demonstrable communication skills. Our local job market, which extends roughly from El Paso to Denver following the route of I-25, is no different. For a study preliminary to proposing New Mexico Tech's degree, I researched the local job market in technical writing and editing. The comments of a writing group manager of Digital Equipment Corporation are typical of the attitudes I found:

> I like to hire people with primary skills in language and secondary ones in technology. . . . The ideal tech writer has a degree in some writing area and a good technical background to go with it. My next choice would be a technical degree and a good writing background. My third choice would be . . . a technical degree and little writing background (Sanders 1983).

Since coming to UNM, I have found still more employment opportunities for strong writers in many non-technical communication careers. None of this information will be news to CPTSC members. At every meeting, speakers document the successes of their students who have used their writing skills during their undergraduate studies for more than literary analysis.

The Intuitive Basis

My intuitive sense of the program's significance has probably had the greatest influence on its design. I agree with E. D. Hirsch, Jr. that "our recent experiment of being exclusively professors of literature has been a rather short-lived and unsuccessful one, with unfortunate practical consequences" (16). One of the most unfortunate of these consequences is implicit in several recent articles in newspapers and national magazines. These articles point out that corporations spend literally billions of dollars every year to train their employees in corporate-administered training schools. The fact of these huge expenditures would be no threat if corporate training meant no more than teaching the application of specific skills to specific jobs. But the focus of today's corporate training is more and more on teaching "analytical skills and critical thinking" (Eurich 1985).

Cultivating precisely those habits of mind has been the traditional province of the University, the special charge of the Colleges of Liberal Arts, and the specific concern of English departments. Literature curricula that teach students writing skills almost exclusively within the context of the criticism of literature fail to fully address our professional responsibility to prepare graduates to act in productive roles in society outside of academe. If we abandon this responsibility to the corporate trainers, not simply the proper teaching of English will be at stake, but the continued existence of the university itself.

In redressing this situation, we should not create new curricula that heavily emphasize the practice of specific, non-academic skills. The underlying problem is that we have too often too narrowly defined what skills should be taught--whether they are academic or non-academic. My best intuition tells me that the most promising future for programs in technical and scientific communication is in English departments as one part of more generalized degree programs that emphasize writing. That same best intuition has a corollary: the most promising future for the traditional study of literature is as another part of those same degree programs.

Conclusion

I am no longer much interested in writing across the curriculum, or even in writing across the professions. I am interested in writing across the English department, in making literacy and its expression in writing the focus of a re-defined English major. Professor James J. Murphy has written that "it is better to light one small curriculum than to curse the Department of Education" (10). Let me alter Professor Murphy's paraphrase by one word only: It is better to light one small curriculum than to curse the department of English. The traditional curriculum in English literature needs to be changed, not abolished or left to wither however proudly away into a quaint museum piece. At UNM, I hope we have lighted one small curriculum.

THE UNIVERSITY OF NEW MEXICO
BACHELOR OF ARTS IN ENGLISH
CONCENTRATION IN PROFESSIONAL WRITING

Professional Writing Sequence

Course	Title	Credit Hours
298	Workshop in Writing: Writing and the Professions	3
320	Advanced Expository Writing: Professional Writing and Editing	3
411	Special Topics in Professional Writing**	3
497	Internship in Professional Writing	1
498	Advanced Workshop in Writing: Senior Project--Independent Study	3

Language and Literature Sequence

250	Analysis of Literature	3
240	Traditional Grammar	3
440	Intro to Linguistics	
441	English Grammars	
445	History of English Language	
275-6	World Lit. Surveys	
294-5	English Lit. Surveys	
296	American Lit. Survey choice of two courses	6
351-410	Upper Division	
450-470	Literature and	
485,486	Criticism choice of three courses	9

Total hours in Professional Writing, Language Study, and Literature 34

Additional Requirements

Professional Complement: 9 hours of upper division coursework in professional/technical/scientific field(s).

Computer Competency: Each student must demonstrate competency in the use of a word processor.

**Students may petition the Committee on Professional Writing to substitute equivalent courses in departments other than English or to take 320 twice, when the topic is appropriate.

PROFESSIONAL WRITING COURSE DESCRIPTIONS

298 WORKSHOP IN WRITING: WRITING AND THE PROFESSIONS

Identifies the role of writing in various professions so that students can assess their interests in the concentration in professional writing. Students propose, document, and complete a library and field research project into the relevance of writing to a professional field of their choice. Writers in various professions visit the class. Students analyze the structure and context of their own writing and of examples of professional writing, relating critical skills associated with analysis of literature to writing and editing skills valued in the professions.

320 ADVANCED EXPOSITORY WRITING: PROFESSIONAL WRITING AND EDITING

The course has different, specific titles. It may emphasize proposal and manual writing one semester; in another, it may focus on report writing. May also vary according to genre, treating legal and medical writing one semester, technical writing the next. Editing is taught in the context of whatever topic offered.

411 SPECIAL TOPICS IN PROFESSIONAL WRITING

Usually cross-listed as a graduate course, English 511, this course approaches topics with greater emphasis on theory than on practice. It is a seminar course designed to allow faculty to bring into the classroom their individual research in professional writing. Topics may range from technical editing to the history of technical and scientific writing; from linguistic approaches to professional writing to the rhetoric of public relations writing.

497 INTERNSHIP IN PROFESSIONAL WRITING

Students arrange their own internship placements. The Committee on Professional Writing has a file of placement contacts. May be taken for credit once only and for one semester hour of credit only. Credit is granted not for the actual experience of the internship itself but for the brief proposal, progress report, and final report that the student must write and submit for evaluation.

498 ADVANCED WORKSHOP IN WRITING: SENIOR PROJECT--INDEPENDENT STUDY

After having completed all of the other requirements or in the semester in which a student will complete all of the other requirements, each student must undertake an independent study project for which he or she submits a proposal, progress reports, and a final report of undergraduate thesis quality that is presented orally and in writing. Projects may derive from the internship experience, from other work experience, or from more usual applications of academic research.

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TECHNICAL COMMUNICATION AND ENGINEERING TECHNOLOGY: NEW PROGRAMS DEVELOPING TOGETHER

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In the early 1970s, when the University of Cincinnati's College of Applied Science inaugurated Bachelor of Science degrees, specific goals were set for the senior design project requirement. One of those goals was professional documentation of all phases of research, design, construction and testing. At the end of the senior year, students were expected to give oral presentations for university and industrial audiences and to submit formal written reports of their work. Those were the expectations; initial student responses demonstrated very different results.

When I joined the humanities faculty in 1979, part of my assignment was to work with mechanical engineering technology faculty to meet the communication needs of senior students. The humanities department officially listed a two-quarter course in technical writing as an upper-division elective. Unofficially, some attempts had been made at working directly with specific departments, but none had been successful. There was skepticism on all fronts and general dismay over the quantum leap in skill expected of students as they catapulted from freshman English and speech to the documentation and presentation of senior projects. After all, these students may design hardware components and the software necessary to run a mini-automated factory that demonstrates principles of computerized manufacturing. They may design and fabricate new product prototypes and energy management systems, but they still balk at the prospect of writing an essay.

In the face of what appeared to be an unbridgeable chasm, we began to chip away at the issues. "You can't expect your seniors to compose logical and persuasive project documentation when you haven't asked them to write anything at all in their technical courses," I charged. "But we ask for lab reports all the time," someone countered, "and you have never been able to teach them to perceive and distinguish conclusions from their experimental results." Until so indicted, I had not suspected that the engineering faculty envisioned the English faculty playing such a role. I asked when they thought their students should achieve this skill. The answer, of course, was during freshman English. Then I asked when, in the mechanical engineering curriculum, students began to accrue substantial laboratory experience, and the answer, of course, was during their sophomore year. Together we began to see that, until students gathered data and experienced results from which they could fashion their own conclusions, the abstract guidelines of freshman English would remain only abstractions. This exchange was an important first step toward shaping our departmental curricula together.

As departmental guidelines developed for engineering aspects of senior projects, communication guidelines also emerged. Nonetheless, we discovered that, on their own, students rarely made connections between the two kinds of activity. For instance, they struggled routinely over formulating design objectives for both their project advisors and for me. Engineering faculty wanted enumerated lists of task-objectives in order to monitor progress and ultimately establish proof of design criteria. I required classification of goals, objectives, and tasks so that students could progress from simple narratives of all they had done and all the setbacks they had suffered to eventually map the logic of their design decisions. Engineering faculty often wanted the task lists to be as lengthy as possible, while I argued that students must be able to reshape and condense these lists in order to control the content of their final reports. Eventually, we learned to circumvent these perceived differences by explicitly defining agreements among ourselves (only after long and lively debate). Then, we delivered the messages together to our students.

This approach has resulted in benefits for all concerned. Because faculty have agreed on performance objectives and prerequisite communication skills, students are no longer asked to demonstrate skills they have not had a chance to practice. Instead of being forced to discover what a literature survey is in order to include one in their final reports, they now move from a preliminary bibliography, to an annotated bibliography, to the review article. This change grew from a great deal of faculty dialogue, curricular reorganization and sharing of instructional responsibility. For example, annotated bibliographies are submitted only to project advisors; I do not see them. At this stage, what must be evaluated is content, and advisors now accept that responsibility, plus the introduction of students to current primary source material in their own specialities. Convincing project advisors that I could not offer this evaluation and guidance was a major accomplishment. Now, we agree that my role is to lead students to analyze research data, once project advisors have found it acceptable, and to compose from that data a literature review. I had to recognize that engineering faculty expected me to singlehandedly provide research instruction, while they recognized there is more to teaching the literature survey than answering the question of how to write one.

On another level, benefits are proving to be more radical and, I think, more profound. As faculties representing separatist disciplines, we are beginning to discover educational process and pedagogy together. We have shared disciplinary knowledge and are starting to appreciate methods of inquiry which are discipline-based. Gone are the naive expectations that, once we trusted each other, we could just manage a lateral transfer of information from one field to another. Instead, we now appreciate our differences in approach, in assumption, in methodology, in evaluation, and in application. We recognize that we do a better job combining those variant perspectives than we do relying upon any one system of inquiry. In short, we are becoming an interdisciplinary learning community.

How far have we come? In mechanical engineering technology, the year-long senior seminar has been organized to lead students from proposals, through project execution and testing, to final design presentations. The resources of several disciplines are built in, and many others are tapped as needed. These external contributions include instruction in graphics, budget analysis, critical path method management, patent searching, and so on. I have authored documentation guidelines, in collaboration with project advisors, to establish report specifications. My own instruction of students takes place throughout the year in a series of seminar presentations and in a one-quarter communication course.

Currently, forty-five to fifty students successfully complete the senior seminar. Its curriculum provides a capstone to their professional education integrating creative, analytical, quantitative and verbal skills. In a recent Chronicle of Higher Education essay, Cornell University President Frank Rhodes claims that, "Students long for a coherent sense of knowledge; [but] the structure of our disciplines discourages it." He describes the traditional liberal arts curriculum as "increasingly incoherent." The remedy, he suggests, is not more of the same as we tack additional liberal arts requirements onto excessive vocational training. Rather, he argues for a professional education that is "broad and expansive and, in the spirit of liberal learning, sees skills as means to larger ends."[1] In my opinion, the curriculum we have fashioned clearly accepts this challenge.

What is next? The humanities department now offers a Certificate in Technical and Professional Communication. It, too, is interdisciplinary, calling for study of written and oral communication processes, organizational structures and psychology, and computer science. Students add to this core additional work in their choice of areas: engineering, management, or further work in communication or psychology. For mechanical engineering students, this curriculum may soon be offered as a technical specialty option among choices which now include mechanical design, energy systems and robotics.

While the collaboration with mechanical engineering continues, a parallel curriculum will soon be in place for the construction science department. Seniors in this department, pursuing degrees in architectural engineering or construction management, have a unique design project format. Architecture students prepare building designs and models for which construction management students prepare feasibility and value engineering studies, cash flow analyses, computerized project scheduling and final client presentations. Communication tasks are quite different for these students. However, they have already joined mechanical engineering students for some pilot sessions which were enthusiastically received.

And so, our own clients grow in number and support. A variety of professional programs express interest in similar curricula. We have grown as we respond to these requests, albeit not in numbers, but certainly in competence and in allegiance to an atypical educational goal. That goal does not neatly fit the department-based major, but it does in fact work. The best description of that goal may well be a comment from Robert de Beaugrande on what he calls the "meta-science of the future." He describes this new "science" as "not physics or math . . . but a general science of cognition and communication that, among other things, can show how the sciences and humanities function as human enterprises."[2] I think we must be models of that enterprise.

Notes

[1] Frank H. T. Rhodes, "Reforming Higher Education Will Take More Than Just Tinkering with Curricula," The Chronicle of Higher Education, XXX, no. 12 (May 22, 1985), 80.

[2] Robert de Beaugrande, "Writer, Reader, Critic: Comparing Critical Theories as Discourse," College English, 46, no. 6 (October 1984), 533-34.

FINDING JOBS FOR TECHNICAL WRITING STUDENTS

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I disagree with Lionel Howard of Bell Laboratories, who said this morning that internships were relatively unimportant in preparing technical writers. Since a successful track record as a technical writer is a leading factor making a graduate employable, an internship or Co-operative Education experience is of the utmost importance, to provide that experience. And once a department has in place a mechanism by which students can earn academic credit for jobs, generating learning opportunities in industry becomes crucial to the continuation of the program. Success in generating jobs can even become a measure of a faculty member's performance.

The Sales Campaign

Companies readily acknowledge that they "need more help" with their writing, and they are disposed, for public relations sake, to consider hiring students and making a contribution to education. They anticipate four major difficulties, however, which your sales campaign must overcome.

Difficulties Business Expects

1. A personnel director expects trouble from the unions if the company starts hiring part-time non-union labor, especially if it has laid off union labor recently.
2. A personnel director expects that because of class schedules, student workers will not be available when

the company needs them.

3. A personnel director pictures undergraduates as callow youths who because of inexperience and immaturity will not contribute significantly to the productivity of the writing department.
4. Directors of Writing Departments may anticipate that too much of their time will be required to train an intern.

Your selling campaign should convince the company that the advantages of hiring a student writer outweigh the first two difficulties. If managers believe that a student writer will benefit the company, they and the personnel director can devise a job description non-threatening to union rank and file. One way out of the second difficulty is to enable students to alternate semesters working and going to school. Your program should offer that option, since most federal agencies and many large companies with Co-op programs in engineering already in place will insist that writing co-ops, too, work full time. Full-time student writers are more threatening to unions, though, and your program will attract more students if it flexibly offers both full- and part-time internships.

The expectation of inexperience can be overcome by helping students fulfill non-paying internships in writing while they look for paying jobs. You can involve them in company writing, for example, for a term project for Technical Writing class. If your college is an urban one, attracting a large percentage of older students, the maturity and experience of the student job-seekers should be added to the selling points in your campaign.

Companies in Cincinnati report that technical writing interns require much less training time than anticipated. Scott Grueninger of Cincinnati Bell Information Systems said at a meeting of the Southwestern Ohio Chapter of the Society for Technical Communication (20 Feb., 1985) that his two interns required only 10% of his time to supervise. He had expected to spend 35% of his work week training them.

Benefits to Businesses Hiring Student Writers

The following are ten selling points or arguments you can use in trying to interest companies in considering hiring your students. Include all ten points in an initial letter, and repeat the ones applicable to a particular company in follow-up telephone calls and presentations.

1. English and Technical Writing majors often possess the writing skills of college graduates.
2. Undergraduates are willing to work for entry-level salaries.
3. Student writers free higher-paid writers to be more productive in other tasks. English majors are trained in library research, for example, that would be time-consuming for regular technical writers to pursue.
4. Student writers can be hired for either full- or part-time positions.
5. Student writers can be hired for short-term projects.
6. Student writers are eager to prove themselves to an employer, aware that employment opportunities for new graduates are limited.
7. Employers are obligated to offer positions only for one term, but they are likely to retain student employees they value.

8. The training costs to a company are low because of the writing skill and intelligence of the students.
9. A professor will visit the worksite, assisting in solving any problems in the writer's performance.
10. Employers can custom-order the training of student writers, asking them to enroll in such electives as Computer Programming, Photo-journalism, elementary Physics, or Technical Drawing.

Your initial letter should go to an executive with enough power to authorize a new job. Going to local chapter meetings of the Society for Technical Communication or the Professional Writing stem of the IEEE will acquaint you with writers who could use the help of a student trainee, and you can ask them who the appropriate executives in their companies are to receive your initial letter. Watch the local newspapers for ads for jobs involving writing or "excellent communication skills," and write to those companies, outlining the benefits of allowing two students to share the advertised job. Your college placement office will probably have a directory of local businesses listing the functions of various vice-presidents, from which you can make an educated guess at the one most likely to be responsive to your letter.

The benefits of hiring students must be repeated again and again, in follow-up telephone calls and in presentations to groups of executives. Recipients of the letter will not remember your points--you will be lucky if they remember receiving the letter! Often they will refer you to others in the company who have not received your letter, and you will need articulately to recap two or three points on the spot, when your call is transferred, before you send that person the letter.

Presentations to Groups of Managers

Giving a presentation to a group of managers is the ideal way to conclude your campaign and to get your students' résumés into the company. If an executive, in your follow-up telephone call, takes you up on your offer to present your program to a group of managers, you will know that they are considering it seriously. Never yet has a company that took time to hear my presentation failed at least to try a writing intern for a term, and all but one have been so pleased that they have promoted the intern into full-time, regular positions upon graduation.

The presentation is a snap, since you need simply to make again for a group points you have already made in letters and on the telephone to one or two executives. Include only one or two points about the mechanics of your program, saving most of that information for their questions. Focus instead upon how the assets of students whose résumés you have brought along can meet their particular writing needs, with which you are familiar from those follow-up phone calls and about which you will learn more in the course of the conference. Be sure to bring along enough copies of the résumés of the students featured for all the participants in the meeting.

Students' Résumés Can Decide a Business to Offer a Job

Students' résumés are very reassuring to prospective employers uncertain about whether to take a chance with your program. If you know that one or two of your students fit the needs of a company, even if a manager refuses your offer of a presentation, ask on the telephone if he/she would like you to send a few of the students' résumés--to illustrate what you have been saying about them.

My remarks about the sample résumés that follow will show the kind

ELIZABETH K. BAMBECK
3427 BOTTOMWOOD DRIVE
ERLANGER, KY 41017
(606) 727-1990

Birth date: July 17, 1963 Single Excellent Health

B.A. in English, degree expected 1985
Northern Kentucky University
Financed 100 percent of college education

ACTIVITIES

THE NORTHERNER, SCHOOL NEWSPAPER
Features Editor, 1984 — responsible for eight writers and meeting weekly deadline.
Operate Compugraphic word processor.

NKU STUDENT GOVERNMENT
Member-at-large; Governmental Affairs Commitee.

PHI SIGMA SIGMA SORORITY
Rush Chairman 1983-1984 — increased chapter size by 60 percent.
Established judicial problem-solving committee.
Founded scholarship fund for incoming students.
Received "Phi Sig Spirit" award 1983.
Panhellenic Delegate; Public Relations Chairperson.

GREAT BOOKS TEACHING PROGRAM 1982
Taught class of gifted high school English students; trained at Miami University of Ohio.

WORK EXPERIENCE

Spring 1984	GRANT PROPOSAL Wrote grant proposal to the Kentucky Humanities Council for Northern Kentucky University's Steely Library.
Summer 1983	BULLOCKS DEPARTMENT STORES

of thing you can mention in discussing particular students, either in a telephone conversation or in a company presentation. I will also treat the students to some extent as case histories, illustrating the part a technical writing professor can play in building their experience and in helping them find co-op jobs.

Elizabeth K. Bambeck, Training Specialist, SENCORP, Cincinnati

Ms. Bambeck has demonstrated her typesetting skill in designing her résumé. Notice that she highlights her extensive campus leadership. Elizabeth lists a grant proposal she wrote for the Northern Kentucky University Library--actually, a term project in her Technical Writing class. Subsequently, to gain more technical writing experience in the summer, Elizabeth edited a 300+-page Manual of Police Procedures for the city of Newport, Kentucky--a project for which she earned independent study credit as a "Special Project in Technical Editing."

Elizabeth was hired as a co-op writer of training materials before she had time to add the police procedures manual to her résumé--although I had talked about the manual by telephone to a technical writing manager and the personnel director at SENCORP, manufacturers of industrial fasteners. But the poise and "zip" acquired through Ms. Bambeck's positions of campus leadership really determined the personnel director, in an interview, to hire her. He told the Director of the Training Center that the company needed her--that she was a far more promising candidate than the usual applicant in response to their ads. Notice that Elizabeth is not an English Education major--although her job would have been appropriate for one. Her sole experience in "training" was teaching a Great Books course to gifted high school students.

After four months in her co-op position--at one point working on

Anthony Frederick Popp
3816 Feather Lane
Elsmere, KY 41018
(606) 342-6371

OBJECTIVE: To gain experience in Writing and/or Computer Science in a business or technological environment.

EDUCATION: Majors: English--Writing Option
Computer Science
Northern Kentucky University, Highland Heights, KY
B.A. expected, 1986

Dixie Heights High School, Fort Mitchell, KY (1978-1982). Graduated 15th in a class of approximately 260 students. College-preparatory program supplemented by electives in Typing, Speech, College-preparatory English, and Basic programming.

RELATED COURSES: Composition I (A) and II (A), Literature I (A), Literary Criticism (B), presently taking British Literature (currently an A), FORTRAN (B), PASCAL (C), Assembler (B)

HONORS: Dean's List, Northern Kentucky University

HOBBIES: Reading, Programming, Athletics, Fishing

EXTRACURRICULAR ACTIVITIES: Semi-Professional Football
Dixie Heights High School: National Honor Society, Latin Club treasurer, D-Club, Football, Baseball, Weightlifting

EMPLOYMENT: VanLeunens, Erlanger, KY
4/1/83 - present
sales clerk

REFERENCES: The following people have kindly consented to provide references whenever I need them:

Dr. David Lavery
Professor of English
Northern Kentucky University
Bus. phone 572-5416

Dr. Thomas Zaniello
Professor of English
Northern Kentucky University
Bus. phone 572-5511
Home phone 781-3599
(Will be out of town July 2-August 17)

Mr. Leondus Beach
English Teacher
Dixie Heights High School
Bus. phone 341-7650

Mr. Bob Burnett
Football Coach, Teacher
Dixie Heights High School
Bus. phone 341-3577

twelve training manuals simultaneously--Elizabeth was given complete responsibility for putting a major manual through production while her supervisor was out of state. She was told after two terms on the job that she would have a regular position as a Training Specialist upon graduation.

The full-time co-op position at SENCORP has forced Ms. Bambeck to juggle her course requirements and to delay graduation by a semester, but she thinks it is worth it. She makes double the minimum wage in her co-op position. Another English major who delayed graduation in order to take the computer language COBOL went out into a technical writing position with a software firm making $21,000. (The latter woman was a 54-year-old swine farmer's wife who despaired of finding a teaching job. The company is now paying for her graduate school at the University of Cincinnati.)

Anthony Frederick Popp, Cincinnati Bell Information Systems

Mr. Popp, with a double major in English and Computer Science, was an easy student to place in a co-op position. Notice, however, that he had not yet taken Technical Writing when he submitted his resume. I advise students to attach writing samples to their resumes, and Anthony had attached a page from his term paper in Literary Criticism. I sent his resume to seven companies before Cincinnati Bell Information Systems finally interviewed him, and I advised Anthony to draft and take to the interview a page of instructions for logging onto the university VAX computer by modem from his Atari home computer.

Throughout his junior year, Anthony wrote marketing documents 25 hours a week for software packages designed by Cincinnati Bell Information Systems (the company a new one generated by the split of Bell Telephone from AT&T). His senior year the company has transferred him

RESUME

John McCauley
2686 Anbeth Ct.
Ft. Mitchell, Ky. 41017

Telephone: 606/341-7101

EDUCATION:

Northern Kentucky University
Highland Heights, Ky.

Expect B.A., English, 1986

HONORS/ACTIVITIES

Nominated for 1984 Outstanding Young Men of America. Two year scholarship, Member of Enjoy the Arts, Christian Student Fellowship, Literature & Language Club and the Editorial Board of Collage (NKU literary anthology).

Dixie Heights High School: National Honor Society, Spanish Club - President, Junior Achievement (3 Yrs.) - President, Newspaper staff - Editor, Honor Roll, Dean's List.

WORK EXPERIENCE:

Fall 1984 — Intern, The Kentucky Post, Covington, Ky. Wrote obituaries and newsbriefs (on word processor), culminating in feature stories (see Publications, below).

Fall 1984 — Aide, Northern Kentucky University. Assisted with experimental composition class for students composing on word processors.

1983 - Present — Tutor, Northern Kentucky University Writing Center - Work with all majors on essays, term papers, memos and reports. Compose on Apple word processor.

1982 - 1984 — Cashier, World of Sports, Florence, Ky. Clerk golf desk, close out cash register.

PUBLICATIONS:

The Kentucky Post, byline stories on Conner High School students' trip to Greece and Italy and on World War II Airmen's Memorial, week of Dec. 10, 1984.

REFERENCES:

Dr. Judith Bechtel
Department of Literature & Language
120 Landrum Academic Center
Northern Kentucky University
Highland Heights, Kentucky

Mrs. Fran Zaniello
Writing Center
238 Business, Education & Psychology Building,
Northern Kentucky University
Highland Heights, Kentucky 41076
572-5611

to writing documentation for the software. The co-op experience has decided Anthony that he would rather pursue a career in technical writing than in programming.

John McCauley, Intern, The Kentucky Post

Mr. McCauley's résumé illustrates the kind of experience you can help your job-seekers acquire that makes them more competitive as technical writers. Notice that John highlights his "training" (tutoring) experience and his campus use of the computer as a word processor.

John's internship with the Kentucky Post was an unpaid job resulting from my campaign of letters and telephone calls to businesses. John earned three hours of credit and acquired two by-line publications to add to his résumé. He was subsequently offered a co-op job involving writing with Procter & Gamble.

Beth Ann Dreyer, Ohio-Kentucky-Indiana Regional Council of Governments

Notice that Ms. Dreyer mentions the procedures manual she updated as a student employee for the university's Learning Resource Center. (A page from this was attached to her résumé.) She could have listed to better advantage her experience on two computers, appearing at the bottom of her résumé. She should also have listed her Technical Writing course.

Beth's unpaid internship at the Ohio-Kentucky-Indiana Regional Council of Governments second semester her junior year promises to become a paid co-op job her senior year, so pleased was the agency with her research and reports on environmental topics. The agency is typical of those that abound in most communities who are delighted to have a student take on a writing project they need completed. Nearly every semester, for example, a student completes a "Special Project in Legal Writing" for the Legal Aid Society of Northern Kentucky, and these technical writing

BETH ANN DREYER
818 Linden Avenue
Newport, Kentucky 41071
(606) 291-1802, home
(606) 572-5491, work

POSITION OBJECTIVE: Entry level assignment in technical writing. Long range objective is to edit and possibly free-lance in writing.

EDUCATION:
High School Diploma
Newport Public High School
May, 1982
Bachelor of Arts in English with an emphasis in writing
Northern Kentucky University, Highland Heights, KY
Degree expected in May, 1986
Additional coursework:
- Literature and writing courses
- Various courses in business, science, history, geology, and math.

WORK EXPERIENCE

Student Employee - Northern Kentucky University, Learning Resource Center, Highland Heights, KY. May 1983 to present. Part-time position. Desk attendant - in contact with hundreds of people every day, inventory books, writing letters, typing, design posters, and library displays, updating procedures manual.

Cashier/waitress - Wendy's Old Fashioned Hamburgers, Newport, KY. May 1982 to May 1983. Part-time position. Customer service, operate cash register, wait tables, close down restaurant with other employees, and manager.

HONORs AND ACTIVITIES:
Dean's List
Tutor of Algebra and English to high school student
Give piano lessons

SPECIAL SKILLS: Have experience on micro-computer and Texas Instruments Home Computer, the latter of which I own.

REFERENCES:

Dr. Elinor Welt
Literature & Language Department
Northern Kentucky University
Highland Heights, KY
572-5416

Dr. Larry Dickson
Literature & Language Department
Northern Kentucky University
Highland Heights, KY
572-5416

internships have been very helpful in students' applications to law schools, along with the recommendations of agency attorneys who have come to know the students' work. Whenever students unsuccessful in their first attempts to find co-op jobs are willing to enroll in special projects in writing, try to match them with agencies appropriate to their abilities and career goals.

Rhonda Rhodes

Ms. Rhodes, a co-op job-seeker for 1985-86, gives the most space in her resumé to her technical typing background, displaying enough familiarity with technical texts to reassure an employer. For a Technical Writing term project Rhonda researched and wrote for the Dean and Provost a feasibility study of expanding Northern Kentucky University's Writing Option in the English major into a full-fledged, interdisciplinary minor in Technical Writing. (Students currently take hard science, math, programming, and technology courses as electives. It is difficult to convince them to take enough of them to guarantee their employment without a formal program.)

Julia Malott-Fightmaster

Ms. Malott-Fightmaster's résumé illustrates the assets a mature "re-entry" student can feature from her life experience. Julia's activities are more campus-oriented than most, but older students who have developed themselves through volunteer work can similarly highlight their responsibilities as community leaders.

Diane Marie Poole

Even if an Honor's student like Ms. Poole has not yet taken your Technical Writing course, she is so bright and versatile that she would enjoy success in a co-op position. I am sending Diane's résumé to

RHONDA RHODES
13033 Webb Lane
Walton, KY 41094
(606) 485-4348

OBJECTIVE: Entry level assignment in technical writing. Long term objective to edit and possibly free-lance in writing.

EDUCATION: B. A. in English, Emphasis in Writing, Northern Kentucky University, Anticipated 1986.

EMPLOYMENT: Days Inn of Richwood, Walton, Kentucky. 1984 to present. Desk clerk/cashier.

Communications Department of Northern Kentucky University. 1983 to 1984. Clerk/typist. Typed materials and tests for professors in department.

L. G. Freeman Company, Erlanger, Kentucky. 1982 to 1983. Typed field service reports written up by six salesmen. Reports covered technical problems found in printing equipment in factories. Took phone orders for machine parts.

Paragon Advertising, Inc., Florence, Kentucky. 1980 to 1982. Secretary to the president. Typed all correspondence and radio programming orders for 100 clients.

Actus, Inc., Florence, Kentucky. 1978 to 1980. Secretary to the Director of Marketing & Sales. Typed correspondence, product brochures and operations manuals for products. Organized and coordinated mailing of 500 product brochures on two occasions.

REFERENCES:

Mr. James Fallon
Vice President
Louis G. Freeman Co.
Erlanger, KY 41018
(606) 371-4433

Dr. Edd Miller
Communications Dept.
No. Ky. University
Highland Heights, KY 41076
(606) 572-5735

Julia Malott-Fightmaster
11 Bordeaux, Apartment 4
Highland Heights, Kentucky 41076 Telephone: 606/781-2133

SPECIAL SKILLS:

Strong organizational skills.
Excellent writing skills.
Exceptional manual and finger dexterity.
Ability to communicate pleasantly and effectively.

EDUCATION:

Northern Kentucky University, Highland Heights, KY
Bachelor of Arts in English, minors in Psychology and Philosophy
Degree expected May, 1986. Dean's List, Honor's List.
Coursework includes: Career Development Workshop
Organizational Psychology intensive course
Writing courses, 15 semester hours
Copy-editing Organizational Psychology text
Writing GPA: 4.0 Overall GPA: 3.54

WORK EXPERIENCE:

Northern Kentucky University Bookstore, 1983-1984
Assistant to buyer of soft goods and educational supplies. Took inventory, stocked, imprinted clothing, assisted customers and typed.

Northern Kentucky University Education Department, 1982-1983
Prepared class materials, processed teacher evaluations, typed, filed, did word processing, handled advertising for the Northern Kentucky Youth Sports Conference. Acted as the department chairperson's administrative secretary while she was on vacation.

Typist, self-employment
Edited and typed term papers and writing assignments for Northern Kentucky University and Chase Law School students.

PUBLICATIONS:

Homemaker ReEntry Center: wrote for bi-monthly newsletter for two years.
Collage, Northern Kentucky University's literary magazine: five pieces published.
Northern Kentucky University, *Gallery of Freshman Writing*, 1982.
Alpha Chi, National Honor Society at Northern Kentucky University, 1984 Symposium: wrote and performed dramatic monologue.
Northern Kentucky University "Women's Week 1983": wrote dramatic monologue (at English department's request).

LEADERSHIP RESPONSIBILITIES:

Guest presentations for NKU Homemaker ReEntry Center.

Public relations and advertising for the "YES" regional play festival at NKU.

NKU Philosophy Club— organize and advertise presentations and meetings.

companies in which a writing department manager has said that there are sometimes places for meticulous general editors. The rapidity with which such a student learns and her eagerness to fulfill the company's expectations should be emphasized in communications about her.

Students' involvement in the meetings of professional societies gives them much more exposure to potential employers. Elizabeth Bambeck and Anthony Popp, along with both their work supervisors, described The Co-op Experience at a chapter meeting of the Society for Technical Communication in February, 1985. The presentation, attended by eight other students currently enrolled in Technical Writing, resulted in a student being hired by a company not previously involved in co-op, and several more students have interviews scheduled.

Diane Marie Poole
809 Stevenson Road
Erlanger, KY 41018
(606) 341-3569

Objective: A position relating to English Education and/or Writing/Journalism.

Education: Majors: English--Literature Option
Secondary Education

Northern Kentucky University, Highland Heights, KY
Related Courses: Honor's English, Literature and Film, Literature and the Human Experience, Shakespeare I and II, British Literature I, Literature of London (Queen Elizabeth College, London), currently taking Introduction to Education, Introduction to Broadcasting.

St. Henry High School, Elsmere, KY
(1978-1982)
Graduated 2nd in a class of 82 students.
College-preparatory program.

Honors: 4-year Presidential Scholarship to Northern Kentucky University.
Dean's List; Fall 1982, Spring 1983, Fall 1983,
Honor's List; Spring 1984.

Hobbies: Reading, Aerobics

Extracurricular Activities: Tau Kappa Epsilon Little Sister

Employment: McDonald's, Erlanger, KY
8/25/80-present
cashier/counter clerk

References furnished upon request.

IS THERE FUNDING FOR INDIVIDUAL AND GROUP RESEARCH IN TECHNICAL COMMUNICATION?

MARILYN SCHAUER SAMUELS
COORDINATOR OF TECHNICAL/PROFESSIONAL WRITING
CASE WESTERN RESERVE UNIVERSITY

Technical writing teachers and program directors are doing research. Having established ourselves as a discipline, the technical writing community is becoming self-analytical and self-evaluating. Secure in our sense of purpose, we are looking to other disciplines for philosophies and for effective methods of conducting research— both theoretical and empirical.

A problem arises, however, when a program, a project team, or an individual attempts to get funding for research. To many of the traditional funding agencies, for example, technical communication is neither fish nor fowl. The interdisciplinary nature of our subject-- the fact that it draws both on Science/Technology and on the Humanities— is in many ways our greatest strengh. We are often one of the few fields of study on campus that can serve as a bridge between scientists, engineers, and humanists. In applying for grants, however, our strength is often a liability. Our work is not scientific enough to qualify for most NSF grants; not humanistic enough to qualify for most NEH funding; and not sufficiently sociological for grants aimed at social scientists.

Just as we were and continue to be the trailblazers in informing the academic and business world that yes, there is an area of study known as Technical Communication, so we will once again have to blaze trails— this time in the territories of public and private foundations.

WHAT ROLE CAN CPTSC PLAY IN TRAILBLAZING?

I propose that CPTSC serve as a repository of information on available funding, and as a catalyst or ombudsman for the purpose of educating foundations and creating new funding opportunities in the following ways:

- An appendix on Research News should be included in the annual *Proceedings*. News might include both members' research in progress, and a listing of public and private foundations known to have funded or be willing to fund technical communication projects with their addresses and deadlines.

- A Coordinator of Research Funding, either one of the existing officers of the Executive Committee or a new officer, should be responsible for visiting grant officers to acquaint them with Technical Communication and assist them in identifying existing grant programs and creating new ones that fit both the foundation's goals and ours. These activities would not interfere with individual applications, but rather prepare the way for a positive reception.

WHAT FUNDING IS CURRENTLY AVAILABLE?

Chances are that many of you doing individual research or program/curriculum development got your initial seed money from your own institution. Your proposal was funded either because you were known and deemed fundable, or because around the time you submitted your proposal the *NY Times*, the Carnegie Foundation, or your college President's favorite stock broker had just made a statement about college graduates not knowing how to write.

You may have initiated or continued your project with money from FIPSE (the Fund for the Improvement of Post-Secondary Education) which has been very kind to writing teachers, but which is currently being phased out. You probably reasoned that preparing students to write properly for industry benefits industry, and that, therefore, private corporations should help pay for the research that makes their future employees better writers. There are large corporations that fund research in communication, particularly research linked to curriculum development and incorporation of modern technology. Exxon, IBM, Zerox, and AT&T, for example, have been generous in the past. Often, last minute grants of $10,000 or so will suddenly become available prior to tax time.

If you turned to the big government-sponsored foundations, NIE, NSF, and NEH, you probably encountered one or two grants that could include technical communication if broadly interpreted.

But, in sum, your best bet, at present, is to get funding from your own institution or from a private national or local corporation. Or, the Society for Technical Communication(STC) offers small amounts for projects that further their professional goals. Otherwise, you may want to read the list of specialized grants in the PMLA Directory. If you happen to be that person of Lithuanian ancestry who speaks fluent Japanese and whose grandmother attended Tuckerville High School in 1932, the $500. offered to whoever meets that description will come in handy.

While my summary of possibilities may not be all-inclusive, the fact remains that, for the most part, technical communication is not addressed in most public or private funding for the basic reason that very few grantsmen are aware it exists.

WHERE MIGHT WE GO FOR FUNDING IN THE FUTURE?

Visiting a university's Research Foundation Office and the New York or Cleveland Office of The Foundation Center, an information source on private foundations, uncovers several possibilities.

The Spin Keyword Index (SUNY's Sponsored Program Information Network) enables you to order printouts in categories such as Agribusiness, Postsecondary Education, Humanities/Science Interface, etc.. The purpose is to find categories within a foundation where technical communication projects might fit and then explain these connections to program officers.

In the NIE literature, for example, is a description of the NIE Center on Postsecondary Teaching and Learning. One of their categories is "Instructional Practices and Programs." Proposals in this category should seek answers to the following questions:

> -What combinations of curriculum content and teaching processes best foster growth in student analytical reasoning, synthetic thinking, and problem-solving?
>
> -In what programs and with what groups of students do various uses of new instructional technologies have the greatest impact on intellectual growth in the first two years of college?

There is probably a place for technical communication projects in this category.

In NSF's Division of Research Initiation and Improvement there is a special section called Research Opportunities for Women (ROW). The intention is to involve women in science and redress past inequities in the selection of project leaders. If a technical communication project involved empirical research conducted by a female project leader, or if a woman in technical communication could develop a joint project with a female engineer or scientist, she might get funding from NSF.

The NEH, most of whose programs interpret the humanities very narrowly as literature/philosophy/history, also has a thrust toward public communication. In their category of Humanities projects which draw on Science and Technology, technical communication research might qualify.

In the private sector, there are prospects for funding of projects that demonstrate ways of using a company's products for instructional purposes: word processors, dictation machines....

Another undertapped funding source is publishing companies. Publishers have diversified their product line to include videotapes, computer programs, packaged training seminars, etc.. The larger ones, especially, might be convinced to fund research that would improve their products or increase the market for their products.

Finally, there is a myriad of little institutes and foundations whose categories are vague enough to include technical communication. They may not have funded a technical communication project yet, simply because no one has asked. Just one example is the Alden B. Dow Creativity Center in Midland, Michigan. They welcome "project ideas from all disciplines," and if you are selected, you get to spend a summer at Northwood Institute with excellent research facilities, clerical services, and the company of other creative people.

If we make a concentrated effort, not just as individuals but as a professional group, at becoming informed about and informing funding sources, it will only be a matter of time before researchers in technical communication will have no other problems than selecting a project and getting their proposals submitted by the deadline.

THE CHALLENGES OF CONSENSUS THEORY IN MODERN RHETORIC FOR TEACHING TECHNICAL WRITING

DANIEL R. JONES
ASSISTANT PROFESSOR
UNIVERSITY OF CENTRAL FLORIDA

I am arguing, as many others have argued, that a grounding in rhetorical theory is central to teaching technical writing. Few would argue otherwise. I want to make this statement more meaningful, however, by describing how I have used rhetorical theory—in particular, consensus theory—for two senior level technical writing courses in our technical writing program.

What is consensus theory? One characteristic is its many labels, including the following which I found in my review of the subject: "the constructionist perspective"; "the consensualist perspective"; "rhetoric as epistemic"; "rhetoric as a way of knowing"; "the rhetorical point of view"; "rhetorical relativism"; "intersubjective relativism"; "'Post-modern' rhetoric"; and "the consensus school."[1]

Another characteristic of consensus theory is its many points of view. Michael Leff, for example, discusses four different views concerning consensus theory in his excellent overview of the subject.[2] The labels that I mentioned refer to the fourth sense that Leff discusses, what he calls the "boldest claim" in consensus theory: the view that "reality is rhetorically created."[3]

The most radical consensus theorists—Barry Brummett and Robert Scott—argue for at least four major assumptions: 1) that objective reality is not knowable (these consensus theorists do not deny that an objective reality exists; they merely claim that it cannot be known because there will always be what Brummett calls "symbolic mediation"); 2) that the realities we do have are intersubjective (we depend on other people for meanings--people "participate in making realities"); 3) that truth is agreement (people create whatever truth exists); and 4) that rhetoric is the way of knowing (rhetoric is the "advocacy of realities").[4] Consensus theorists insist that we derive our meanings--realities--not from ourselves alone--solipsism or subjectivism--and not from an objective reality--objectivism--but from each other through agreement--intersubjectivism.[5]

What most obviously makes consensus theory relevant to technical writing is that it relies heavily on the philosophy, sociology, and history of science, such works as Thomas Kuhn's The Structure of Scientific Revolutions, Steven Toulmin's Philosophy of Science, and Werner Heisenberg's Physics and Philosophy.[6] Brummett uses these works and others to attack the notion of objective knowledge in the sciences. He argues that "no science can possibly directly observe absolute nature," that scientific theories are "ways of representing what is observed and are not nature itself," and that "The very nature of observation, the approach towards the observed by the scientist, is a linking of the two. Real detachment would mean no observation at all."[7]

Last fall term I taught a course entitled "Survey of Scientific and Technical Literature" using one of the major ideas of consensus theory--that science is rhetoric (that science is fundamentally argument)--as a course theme.[8] I used the first half of the course to set the stage for this approach by discussing the major literary, rhetorical, and other stylistic devices employed by science writers in a number of science classics. I did not discuss the nature of scientific knowledge at this point in the course. Instead, I just wanted the students to see that science writing, even at its best, makes use of many persuasive strategies.

For the second half of the term, I used four works which are well suited for challenging the basic assumptions of science and for discussing the notion that science is rhetoric: James Watson's The Double Helix, George Simpson's The Book of Darwin (which contains many selections from Darwin's work and excellent commentary); Rachel Carson's Silent Spring; and Stephen Jay Gould's The Mismeasure of Man.[9]

Students studied many topics from the rhetorical point of view, including the attitudes of the scientist toward his subject and his audience, the personae of scientific discourse, and the nature of scientific knowledge.[10] The course also stressed the social and cultural contexts of science by focusing upon the nature of the scientific community, the role of the scientist in society, science and the mass media, and science and government policy. Carson's and Gould's books are particularly helpful on these topics.[11]

Students took many different approaches in their papers on the science is rhetoric theme: including discussing challenges to the notion that Darwin epitomizes the "objective" scientist; discussing how The Origin of Species is a persuasive argument; analyzing Gould's critique of science as an "objective" enterprise through his focus on determinism; discussing criticisms of Silent Spring for being unscientific; analyzing how Morris Berman's The Reenchantment of the World, and other works I lectured about in class, challenge the modern scientific consciousness; and even defending the ideal of objectivity in science as a necessary concept (Jack Orr, Richard Cherwitz, and Earl Croasmun).[12]

On a more practical level, several students focused on the implications of a rhetorical approach to science writing for the technical writer, a topic which we discussed often in the term. Some students wrote papers on the increasing trend of achieving a personal point of view, an informal style, and a less serious tone, especially in user manuals in software documentation. Although this new trend is perhaps not a direct result of all the theoretical discussions claiming that science is rhetoric, students can see that both the theoretical and the practical approaches suggest that we are changing our notions of what technical writing is.

Consensus theory's position that science is rhetoric, and my increasing interest in the possible practical applications of this view, led me to explore the subject further in a new course entitled "Technical Vocabulary." I have set many objectives in this course: to study the nature of and sources for technical and scientific terms, to examine the specialized vocabulary of different professions and how that vocabulary is often misused, to look at a number of scientific and technical dictionaries, to analyze readability indexes, to review major problems of style in technical writing, and to analyze many levels of technical writing.

To fulfill some of these objectives, at least the ones pertaining to problems of style and levels of technical writing, I used rhetorical theory to argue for more creativity in technical writing.

Consensus theory helps us to argue that, as Brummett suggests,

> art and science are very much alike. Both seek to recreate and unify experience, rather than simply report it. This means that science, like art, will be a creative process. The scientist has no choice but to be creative. Nothing is given to the senses in a whole or organized form. The scientist and the artist . . . must perceive by organizing partial impressions.[13]

A grounding in consensus theory, which rejects so strongly a positivist view of reality, allows us to see scientific and technical writing as the persuasive writing forms that they are. Yet, even if we do not accept the assumptions of consensus theory, we still must accept the important role of persuasion in any other view. Daniel Marder argues that

> We fail to realize that in technical reporting, only the subject is technical. . . . the substance of technical reporting remains a formal discipline of the mind: a rhetorical discovery of the best ways and means to persuade an audience.[14]

What do I mean by creativity in technical writing? Experimenting with and challenging conventions of technical writing to communicate more effectively, and often more informally, with the reader.

Creativity includes all of those elements which are not readily associated with technical writing: literary devices such as metaphors, similies, point of view (our decision to be personal or impersonal in our writing), irony; persona or ethos (whether or not we convey a positive or negative image of ourselves in our writing); clever use of denotation and connotation of words; and humor. In short, creativity is employing all the fine points of style which intensify the power of the technical prose and which emphasize the presence of the writer.

Of course, an emphasis on creativity in technical writing is a change from traditional views. Reading various discussions defining technical writing (Britton's, Hays's, Stratton's, Dobrin's), we have a much different picture.[15] From these sources we learn that technical writing is functional, job-related, information oriented, an act of communication rather than an act of self-expression, writing which focuses foremost on the relationship between the reader and the subject, more objective than subjective, writing which seeks to convey only one meaning, writing which has a specialized vocabulary, writing in which the tone is chiefly serious, unemotional, and so on.

These views of technical writing do allow use of some of the creative elements discussed earlier, but these traditional views are not flexible enough, especially considering today's audiences. Merrill Whitburn and David Bradford are two of many to comment on this failure. Whitburn writes,

> The pursuit of impersonality in technical discourse seems not to have worked. Writers have strained against the obligation to write impersonal prose, and readers have been bored by

> it. What is needed are rhetorical approaches to shape a persona that makes vivid appeals to the senses and subtle appeals to the emotions.[16]

Whitburn cites examples of computer user manuals which exhibit more persona—moderate examples such as *Fortran Programming: A Spiral Approach* and *The Applesoft Tutorial* to more radical examples, such as *Getting Started With TRS-80 BASIC* and *A Fortran Coloring Book*. Whitburn recognizes that these manuals "signal substantial changes in the nature of industrial discourse."[17]

In the most recent issue of *Technical Communication*, David Bradford argues that technical documentation, particularly in the area of data processing, is confronted by the challenges of a new audience of non-technical readers, and that we must find new techniques to communicate with these readers.[18] He believes that "technical writing is rejoining the mainstream of rhetoric," and that the technical writer is now employing a more forceful style in "more functional technical writing."[19] Bradford writes about new writers who "intentionally violate the conventions of technical writing," who "are presences in their prose," who "entertain" as well as inform.[20] He believes that "the rhetorical skills required in our new role are those that we have been most thoroughly trained in."[21] Bradford suggests that we freely employ rhetorical methods such as "original style, metaphor, comic relief, irony, incentive, and praise."[22]

Bradford's work is just the most recent in a steady flow of articles on how technical writing must accomodate a new, non-captive audience (Marder, Guinn, Henderson, Thing, Edens).[23] A solid foundation in rhetorical theory can show us ways to reach this audience. As Daniel Marder and Dorothy Guinn have argued in their article "Defensive Aesthetics for the Technical Writer," "When we acknowledge our basic underpinnings in rhetoric, we find it easier to produce naturally appealing rhythms and arrive at an ebb and flow of the general with the specific, abstract with concrete, narrative with report, connotation with denotation."[24]

We need to recognize the essential role of rhetoric in our introductory technical writing courses as well as in the advanced classes. Consensus theory can help us to address what John Brockmann calls the "philosophical incongruity" between the medium and message which is so apparent in the typical introductory course.[25] He says that scientists and engineers are idealists about language and reality, that "the students' message is suffused with the logical positivism of the scientific approach."[26] Technical writing students give little attention to audience, tone, ethos, and method of development, because they believe that what they have to say will be as true for one group as another, that facts speak for themselves, that rhetorical devices mean tampering with scientific truth.[27]

Consensus theory helps students to understand the nature of "facts" in science, to accept that science is argument, to realize that technical writing is based on rhetoric, and to strive for greater creativity in their writing. Certainly, consensus theory presents many challenges and is therefore crucial to an understanding of our discipline.

NOTES

[1] I am using the term consensus theory, one of the terms most commonly used in discussions of this area of modern rhetoric. For the other terms see the following sources: Jack C. Orr refers to "the constructionist perspective" in "How Shall We Say: 'Reality is Socially Constructed Through Communication?'" Central States Speech Journal, 29 (1978): 263-74; Carolyn Miller mentions "the consensualist perspective" in "A Humanistic Rationale for Technical Writing," College English 40 (1979): 610-1; Robert Scott discusses "rhetoric as epistemic" and "rhetoric as a way of knowing" in "On Viewing Rhetoric as Epistemic," Central States Speech Journal 18 (1967): 9-16; Trevor Melia comments on "the rhetorical point of view" and "rhetorical relativism" in "And Lo the Footprint . . . Selected Literature in Rhetoric and Science," Quarterly Journal of Speech 70 (1984): 303-313; Michael Leff refers to "intersubjective relativism" and "'Post-modern' rhetoric" in "In Search of Ariadne's Thread: A Review of the Recent Literature on Rhetorical Theory," Central States Speech Journal 29 (1978): 73-91; and Celeste Railsback writes about "the consensus school" in "Beyond Rhetorical Relativism: A Structural-Material Model of Truth and Objective Reality," Quarterly Journal of Speech 69 (1963): 351-63.

[2] Leff, "Ariadne's Thread," pp.73-91.

[3] Leff, p.82.

[4] The following articles by Barry Brummett have been the most useful for my summary of some of the major themes: "Some Implications of `Process' or `Intersubjectivity': Postmodern Rhetoric," Philosophy and Rhetoric 9 (1976): 21-51 and "On to Rhetorical Relativism," Quarterly Journal of Speech 68 (1982): 425-30.

[5] Brummett, "Some Implications," p.30.

[6] Brummett mentions only these sources in his notes for "Some Implications," but many other important sources are available in the philosophy, history, and sociology of science.

[7] Brummett, "Some Implications," p.25; p.25; p.26, respectively.

8 Michael Halloran says, in summarizing this view, that "science necessarily involves rhetoric," and that "science is argument among scientists." See "Technical Writing and the Rhetoric of Science," Journal of Technical Writing and Communication 8:2 (1978), p.82 and p.81.

[9] Watson, The Double Helix, ed. Gunther S. Stint (New York: W.W. Norton, 1980); The Book of Darwin, ed. Gaylord Simpson (New York: Washington Square Press, 1982); Carson, Sil[illegible] Spring (New

York: Fawcett, 1978); and Gould, The Mismeasure of Man (New York: W.W. Norton, 1983).

[10] Philip Wander's "The Rhetoric of Science," Western Speech Communication 40 (1976): 226-35, is one of several excellent sources which offer useful topics for discussion.

[11] For example, Carson's Silent Spring was largely responsible for establishment of some government guidelines for control of pesticides, and Gould's The Mismeasure of Man is an in-depth critique of the social and cultural influences on some of the best scientists of the nineteenth century.

[12] Berman, The Reenchantment of the World (New York: Bantam, 1984); Jack Orr, "How Shall We Say"; Richard Cherwitz, "Rhetoric as a 'Way of Knowing': An Attenuation of the Epistemological Claims of the `New Rhetoric,'" Southern Speech Communication Journal 42 (1977): 207-19; and Earl Croasmun and Richard A. Cherwitz, "Beyond Rhetorical Relativism," Quarterly Journal of Speech 68 (1982): 1-16.

[13] Brummett, "Some Implications," p.42.

[14] Marder, "Technical Reporting is Technical Rhetoric," Technical Communication 25:4 (1978): 11.

[15] Earl Britton, "What is Technical Writing? A Redefinition," College Composition and Communication 16 (1965): 113-116; Robert Hays, "What is Technical Writing?," Word Study, April 1961, pp.1-4; Charles Stratton, "Technical Writing: What It Is and What It Isn't," Journal of Technical Writing and Communication 9:1 (1979): 9-16; David Dobrin, "What's Technical About Technical Writing?" in New Essays in Technical and Scientific Communication: Research, Theory, Practice, edited by Paul Anderson, John Brockmann, and Carolyn Miller (Farmingdale, New York: Baywood Publishing Co., 1983).

[16] Whitburn, "The Ideal Orator and Literary Critic as Technical Communicators: An Emerging Revolution in English Departments," in Essays on Classical Rhetoric and Modern Discourse, edited by Robert J. Connors, Lisa S. Ede, and Andrea A. Lunsford (Carbondale: Southern Illinois Univ. Press, 1984), p.244.

[17] Whitburn, p.244.

[18] Bradford, "The New Role of Technical Communicators," Technical Communication 32:1 (1985): 13-15.

[19] Bradford, p.15.

[20] Bradford, p.15.

[21] Bradford, p.15.

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[22] Bradford, p.15.

[23] Daniel Marder, "Technical Reporting is Technical Rhetoric," Technical Communication 25:4 (1978): 11-13; Dorothy Guinn, "Ethos in Technical Discourse," The Technical Writing Teacher 11:1 (1983): 31-37; Allan Henderson, "The Care and Feeding of the Non-Captive Reader," Technical Communication 31:3 (1984): 5-8; Lowell Thing, "What the Well-dressed Manual is Wearing Today," Technical Communication 31:3 (1984): 8-12; and Bert Edens, "Readability and Creativity in Technical Writing," Journal of Technical Writing and Communication 10:4 (1980): 329-35.

[24] Marder and Guinn, "Defensive Aesthetics for the Technical Writer," Journal of Technical Writing and Communication 12:1 (1982): 40.

[25] Brockmann, "What's Different About Teaching Technical Writing," The Technical Writing Teacher ?? : 78.

[26] Brockmann, p.178.

[27] Brockmann, p.178.

TEACHING COLLABORATIVE TECHNICAL WRITING PROJECTS

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As Paul Anderson has stated, Technical Writing and Editing programs must prepare students for the broad definition of technical communication which includes organizational and managerial skills; computer skills; and research, graphic, design, oral, and production techniques, as well as writing and editing skills.

Using concrete, actual collaborative course assignments can effectively incorporate all these skills and techniques. Three consecutive courses, which I have designed and taught over the past four years, Technical Documentation I, II, and III, show the success of this empirical method. All three courses involve research, analysis, writing, editing, and production.

Teaching technical writing today requires new and innovative methods. Having students practice writing process descriptions, operation descriptions, and instructions are good, basic technical writing techniques, but more complicated, organizational practice is needed so that students feel comfortable in any task required in a technical writing environment. These three core courses in our program for minor or major options provide intensive practice in developing skills and techniques necessary for the professional, technical communicator.

Technical Documentation I teaches students, as a class, to put together a Style Guide and Standards manual suitable for use in a software, hardware, or engineering environment. A class of 15 to 20 students can, in a 16 week semester, produce an effective manual appropriate for use in subsequent class situations or by actual industry documentation groups.

The first step in creating this Style Guide and Standards manual is research. The students are required to read books and articles devoted to all aspects of technical writing. They summarize and analyze this research, sharing it with the entire class in the form of written and oral criticism. The students then read and analyze manuals obtained from local and national businesses and institutions. The manuals are reviewed in class and their problems and attributes discussed. Open discussion of these problems in technical writing not only stimulates the students, but also encourages them to devote time to their special interests. As the research becomes more definitive, the students gravitate to those areas that appeal to them. Some students become very curious about production, while others who have had little exposure to art are anxious to learn about graphics and their use. Thus, a firm foundation for further research in this, and in other classes such as Technical Publications or Technical Graphics, is created.

At this point, the students begin to classify and divide those elements they have decided are basic to creating technical documents. In addition, they read, analyze, and discuss existing style guides, standards manuals, and writing texts.

To facilitate this research, the UCF English department has established a technical writing laboratory and library. We have computer word processing capability available to the students as well as a small collection of books, manuals, software, and journals.

After three weeks of research and discussion, each student writes a preliminary proposal suggesting specific sections in the manual such as Style, Mechanics, Production, Format, Graphics, etc. These preliminary proposals are then reviewed by the class and final decisions are made as to the general content of the manual. All of this preparatory work requires careful and subtle guidance by the instructor. The students are encouraged to be creative and imaginative while keeping the purpose of the project foremost in their minds.

The class, working as a group, then prepares a final proposal for the instructor's approval. At this point, the instructor selects students to work on the various sections. Some sections, such as Format and Common Items, require more writing than others so depending on the size of the class, the students are separated into groups of 2,3, or 4. Usually an assistant editor is appointed to help the instructor who acts as the final editor. Class time is set aside for group work sessions.

Creating this manual is time-consuming and complicated, but if it is well-organized, (a good way to teach one of the basic elements of good documentation: organization), then the students not only learn how to put a manual together, but also learn to work with one another and with outside source people.

Each group divides its section into appropriate subsections and assigns members of that group to research and write those subsections. For example, the Style section may be divided into subsections of Usage, Tone, Readability, and Editing. Each member of each group prepares a working outline for his or her subsection which must be approved by the section group, the assistant editor, and the instructor.

At first the writing is difficult. It is sometimes hard for the students to sift through the vast amounts of material available. The instructor must work with each group, helping to decide what to include and what to discard. In addition, each group must interview at least one professional who is an expert in that particular area. This interview allows students not only to meet people working in the field but also to get valuable information that is current and in use. Most students are amazed when technical writers in the community enthusiastically welcome their questions. The experience can give both students and professionals fresh insights into common problems.

As each student finishes a rough draft of a subsection, it is given to the rest of the group for approval, editing, and cross referencing. It is most important that the style of each section be written in parallel construction and similar tone. Reading other subsections and sections helps the group to write consistently. After each section reviews its own material, it is passed to all other groups for further editing. At this point, the assistant editor checks each subsection for consistency, necessity of redundancy, and accuracy.

These activities take place at each class meeting, enabling the students to become familiar with the contents of the entire manual. They also have the opportunity to discuss any problems with the class, the assistant editor, and the instructor. The students might question the rationale and theory behind certain areas of the manual causing the author of the disputed area to respond with further research to back up his ideas.

I have seen members of a class discuss the proper and best placement of page numbers for two hours. The discussion was serious, showed a great deal of preparation, and produced a thoughtful, well-organized logical plan for pagination.

The instructor acts as the final editor for the manual, but the class must be encouraged to make its own decisions based on research and class discussions. Not only do the class members decide what must be put into the manual, they also follow what they have written. The Style Guide and Standards manual becomes an example of the recommendations made in the manual itself.

I put this course together four years ago and have taught it six times. Each semester the final manual is unique in style, format, tone, etc. because of the makeup of the class, its own experiences, and because of the availability of new material.

The four pronged-editing process (within the group, between groups, assistant editor, and editor) provides an excellent opportunity for many learning situations. Of course, the students learn proper editing principles, proofreading, consistency, and the need for precise format. In addition, they learn the need for redundancy, and parallel structure.

When the manual is edited, and a final draft is ready, the class prepares the peripheral material: Table of Contents, List of References, General Description, Index, Glossary, etc. These assignments reinforce the entire process, providing students with the opportunity not only to learn how to prepare these items but once again to review the document.

As the work reaches its final stage, each student must learn to operate one of our computer word processors. Our student lab assistants train them, then input the rough drafts for the students, who then must edit their own material and produce hardcopy for review.

As these final tasks are performed and the deadline nears, the students want to change, delete, or add material. They realize it is an impossibility because they have a deadline to meet. They have learned another valuable lesson: there is a time to call a halt to revisions.

These same tasks are repeated, but in a different form, in the next course, Technical Documentation II. Using the Style Guide and Standards manual as basis, the students, again as a class, produce a manual for an actual project for a division of the university or for some outside source. This course has produced a user manual for a graduate student's Master's thesis, a user manual for a software program for use in production in a large technical documentation division; a user guide for CRES (Computer Readability and Editing System), a Navy project under the direction of Dr. Peter Kincaid; a user guide for the university's computer science laboratory on Waterloo Basic, a computer language; and a training and user manual for building solar energy efficient buildings in humid climates for the Florida Solar Energy Center. These are just a few of the projects available to our students in this course.

Each project provided the students with a source person who attended class meetings from time to time, reviewed proposals and drafts, and critiqued the student's handling of content and format. For example, the graduate student, Larry Hall, demonstrated the software program as he wrote it. Both he and Dr. Kincaid welcomed student criticism, using their suggestions to implement ideas into the programs.

As in Technical Documentation I, the students read, research and analyze the material necessary for the project. They also establish audience level. They are divided into small groups and assigned a portion of the project to write. They are required to write proposals for each section, and for the entire manual. They write bi-weekly progress reports directed to the source person and to the instructor. The students are responsible for writing their assigned sections and for providing graphics for that section. These graphics can be original, or adapted from existing material. Again, the subsections are edited by the group, by other groups, and by the editor (the instructor). The students in Technical Documentation II use the computer to enter their own material and to edit and print final copies.

The same methods of cross editing and review used in Technical Documentation I are practiced in this course. Having a source person available gives them the opportunity to develop interview and questioning techniques which are so important in technical writing. These projects allow the students to write, design, edit, and produce a professional collaborative document, all of which are in use today.

Technical Documentation III requires each student to find, research, write, and produce an individual document for an actual project. Students have written training manuals for employees at Sea World; Standards of Operation for employees at Disney World; laboratory manuals for physiology, ecology, computer science, and engineering; grant proposal directions for the office of Sponsored Research, and instruction manuals for the use of specific tools and instruments for various companies and divisions of the university.

Each student submits a proposal which must be approved by the source person and by the instructor, bi-weekly progress reports, and bi-weekly drafts of the project. The final document is presented to the source organization and to the instructor for evaluation. This course is treated as independent study, with the students meeting in the instructor's office by appointment.

In addition to the tasks connected with producing the documents in each of these three courses, Technical Documentation I, II, and III, each student is required to write a detailed evaluation of each course and the experience provided. These evaluations have been honest, full of helpful suggestions, and concrete criticism (most of which has been incorporated in our program--but that is a subject for another paper). The enthusiasm and appreciation the students express is most gratifying. Our students and our graduates are very enthusiastic about these courses. They have expressed appreciation for the opportunity to work on real projects that will enhance their abilities as Technical Writers. They include these projects in their portfolios when they interview for positions and find that prospective employers are impressed with the professionalism of their education. All of our graduates are employed as Technical Writers to date. But foremost in their evaluations is the comment that is repeated over and over again: These three courses have taught them to be precise, to think clearly, and to write in a concrete and organized manner. Our objectives have been met. Our students are professional, technical communicators, able to perform any task required in a technical writing environment.

THE PLACE OF "MEDIA LITERACY" IN THE TECHNICAL COMMUNICATION CURRICULUM

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Introduction

The ability of contemporary electronic media to immerse their users in intense interactive experiences has made them the tools of preference for communication, training and development. Interactive videodiscs, representing the fusion of computer and video technology, and teleconferencing, representing the utilization of satellite and video technology, allow their users to actively participate in a "media experience" rather than simply serving as passive viewers. A knowledge of and an ability to work with these electronic media are very important to the student of technical communication, both because the electronic media have reached a refined level of useability and because they have become so widespread. Compounding his "need to know" is the critical importance of technological information and its dissemination in contemporary society; virtually everyone, from engineers and scientists working with technology on a professional level to the average person working with his first computer, needs to have information about different aspects of technology and science. The student of technical communication must be able to meet the requirements of media to fulfill his role as an agent for the effective dissemination of technological knowledge.

The purpose of my paper is threefold: to discuss the nature of interactive videodiscs and teleconferencing, to present the requirements of media literacy for the student of technical communication to work with these media, amd to analyze the need that makes this media literacy significant.

Videodisc Technology

Interactive videodiscs utilize the video power of the laser disc and the programming and graphics power of the computer.[1] The "information" that makes up each video frame on a laser disc begins on a regular videotape. A video team records the pictures to be used. The videotape is edited, if necessary, and sent to a mastering facility where it is transferred to the disc[2] using a laser that "burns in" the video information by firing in an on-off binary code. Each video image that one sees from the disc on the video monitor screen occupies one 360° track on the disc and is comprised of 400 000 bits of laser readable information.[3] One side of a disc has about 54,000 still frames, which equals 30 minutes of full motion video. Access to the video images is provided by a laser disc player attached to a video monitor.[4] While the quality of the video images substantially exceeds that of videotape, especially in still frame, the full power of the disc is realized when a computer is brought into play with its programming and graphics power.

The computer drives the disc player as it would any other "dumb" peripheral. It is programmed to guide the user and to access video on the disc quickly and efficiently. There may be various inputs to make the computer and the disc player work together, including a standard keyboard, a joystick, a keypad, a light pen, a touch screen, or a study guide with bar codes (like the Universal Product Codes (UPC) on packages in supermarkets) read by another type of light pen.[5] Typically, the computer program branches from a main menu or from information or a situation that is presented on part of the disc (Illustration 1). For example, the American Heart Association uses a disc to teach cardiopulmonary resuscitation (CPR). Wired to electronic sensors in a manikin, the computer tells the student how well he works at resuscitation. To "save" the dummy, the student teams up with a "teacher" on the video monitor. If the student breathes into the dummy's mouth at the right time, the teacher keeps up his rhythmic compression of the victim's chest. If the student's timing is off, the disc branches to another sequence in which the teacher says, "You were a little late that time. Could you try again?"[6] This example is just one of many as discs are finding more applications in a number of fields.

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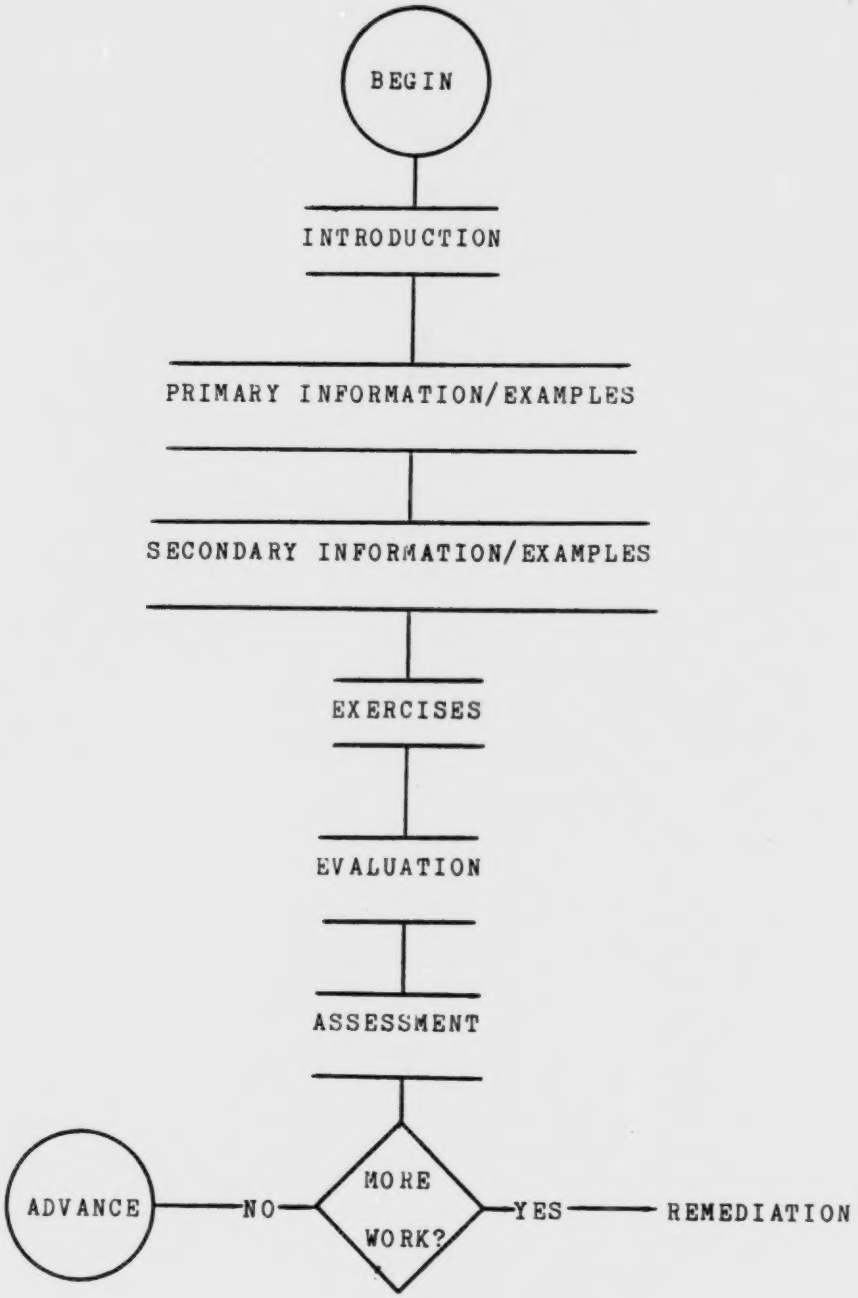
BEGIN
INTRODUCTION
PRIMARY INFORMATION/EXAMPLES
SECONDARY INFORMATION/EXAMPLES
EXERCISES
EVALUATION
ASSESSMENT
MORE WORK?
ADVANCE
NO
YES
REMEDIATION

Illustration 1: A Low Level Interactive Computer Program

According to Carroll Bowen of Kalba Bowen Associates, disc use covers the whole spectrum of industry and business. The major categories of current and future demand include automobile manufacturing, utilities and transportation, electronics, medical education, extracting and processing industries, insurance, and merchandising.[7] Recent figures indicate that out of a total of about 800,000 disc players in the United States there are about 150,000 that are fully interactive. Of this number, 59% (90,000) are for industrial training, 29% (50,000) are for military training, 5% (7,500) are for education, and the remaining 7% are utilized in various businesses, including game and point-of-purchase markets. Examples of disc programs in various fields abound. The "First Responder" first-aid kit for remote off-shore oil rigs has medical supplies and a disc program featuring a trained instructor.[8] Much of the confusion in training individuals to use computers has been overcome by a series of disc programs introducing the user to the operation of a particular model and various software programs such as Wordstar and Database II.[9] Another computer manufacturer, Digital Equipment Corporation, thinks discs can also eliminate much of the confusion in training those who design and repair computers: it expects to have 75% of its field training accomplished via disc by 1987.[10] Other developments include voice-activated discs discussing various surgical procedures for use in medical education and, if necessary, in the operating theatre itself,[11] and "movie maps" such as the one created for the Army that takes the mechanic on a "tour" of the inside of a jeep engine so he knows it literally inside and out before he works on it.[12] Creative programming and quick access are two of the major reasons for choosing discs, but other developments also take advantage of the great amount of storage space available. The Army plans to take delivery of 20,000 Electronic Information Delivery Systems (EIDS) by 1990. As currently designed the system will fit in a small package weighing about 50 pounds and will be used to solve a number of logistical problems associated with the vast amounts of information required to maintain and repair equipment. The entire 44,000 page manual for an M-1 tank will fit on one side of one disc, while the entire 88,000 page manual for the Patriot missile system, normally occupying 27 linear feet of shelf space, will fit on a little more than one and a half sides of one disc. Not only will the disc and its playback system be less bulky than written materials but information will be more easily and quickly found.[13]

Teleconferencing Technology

Interactive discs are an "intimate" electronic media technology: usually one person immerses himself in the interplay involved in using the specific program. Teleconferencing, on the other hand, involves individuals personally interacting with one another, oftentimes over hundreds or thousands of miles, via an audio/video link established by satellite. For long term technical and economic benefit the best systems have the capability of sending (uplinking) and receiving (downlinking) through a transponder on a satellite in geostationary orbit 22,300 miles above the earth. In many cases economic constraints and availability of transponders are such that the signals may be transmitted and received at leased uplink and downlink sites and sent to the user over telephone lines or a mobile unit may be leased and brought to the downlink site. While the elements of teleconferencing technology may vary from user to user, its key characteristic is that it allows groups of people to interact with little regard for distance. For example, a recent international teleconference featured communication between the Archbishop of Canterbury in England and the presiding bishop of the Episcopal Church in America.[14] Another teleconference linked one group from the Alliance Theatre in Atlanta with another group in New York so they could plan a production.[15] The activities represented by these two examples is typical of the diversity enjoyed by teleconferencing. This technology is regularly employed by a range of business, professional and educational groups.

A number of major companies are building facilities for teleconferencing. One of the leaders has been Aetna Life Insurance: the company began installing a permanent link between branches when a pilot program between March, 1981 and January, 1983 showed that 5,000 meetings involving 30,000 people were conducted at a saving of $500,000 in what would otherwise have been lost travel time.[16] Other companies have followed this lead and are building similar networks: among them are ITT IBM, and General Motors. In addition, educational networks are emerging including the National University Television Network (NUTN) and the American Educational Television Network (AETN). The technology has proven so attractive that a number of organizations provide teleconferencing links via private or custom-designed temporary networks; these include the Holiday Inn motel chain HINET system and Videostar services, among many others. Example of the work done by private or custom-designed temporary networks include a seminar entitled "Laboratory Testing: New and Future Procedures" for 56,000 medical technologists and pathologists in 31 cities in the United States[17] and a six hour national training session by Tektronix for 200 salesmen to introduce two new instruments.[18]

Media Literacy Requirements

Both disc and teleconferencing technology require production teams. Disc teams consist of a media producer, a subject matter expert, and a computer programmer, while teleconferencing teams consist of a media producer, a subject matter expert, and a teleconferencing coordinator. The technical communicator fits well into either team, especially since many of the subjects developed for and under development for these media deal with science and technology.[19]

The technical communicator brings his communication expertise into play by helping to assure maximum shared meaning among team members and by assuring that the final production has maximum meaning for the end-user or participants. In his capacity as "communication expert" the technical communicator coordinates information from each team member to assure that each understands the other, especially since the only one who has a real working knowledge of the topic is the subject matter expert. Because of his technological expertise he also serves as the one who "translates" the message so it is appropriate for the specific user. On the one hand he assures the integrity and accuracy of messages for low level users who are the "techno/peasants"[20] primarily concerned with consumer technology.[21] On the other hand he sees that there is quality and accuracy of messages for high level users such as engineers, scientists and technicians who are working with the most sophisticated development in their special field or who are upgrading their knowledge to maintain themselves in their field.

To best be able to fulfill his functions as a technical communicator working with discs and teleconferencing, however, there are a number of requirements for him to have the necessary "media literacy". Computer programming is basic knowledge for the technical communicator working with discs. But, more specifically, since he is working with a different form of communication technology that works best when it immerses its users in the communication activity, he must understand the range and limits of computers when applied to interactive situations. A grasp of special "authoring languages" which provide much of the interfacing for computers and discs can help him achieve this since these ready-made languages were designed with interactivity in mind Working with a variety of computer programs for interactive discs can help him understand interactivity and the advantages and limits of different languages. Most importantly he must work with computer programming in order to be able to "futurize". The ability to "futurize" is a significant aspect of the technical communicator's "media literacy" because the best interactive programs show a grasp of the flow of information and ideas so the relationships and consequences of different information and situations are integrated in a coherent body of visual materials and computer programming.

A grasp of the dynamics of electronic media production is also an important part of the "media literacy" of the technical communicator. Electronic media have special requirements as the producer translates information from written form into visual form. The technical communicator must be able to visualize his subject so that the verbal and the visual are complementary and unified. A part of this ability to visualize is the ability to write for the ear. As visual images are concrete and dynamic when properly produced for electronic media, the language of these media is concrete with strong movement to the precise detail and thought.

The technical communicator must also understand the performance requirements for electronic media. In working with those who will be acting out a script or with those who are interacting in a teleconference in the "real world" he must adapt to the particular medium for his performers. Those who perform for videodisc productions are usually acting for television and must have their scripts precisely developed for their part. Those who perform for teleconferences must understand both the skills of the expository speaker whose prepared presentation is tempered by the demands of electronic transmission and the skills of the extemporaneous speaker whose spontaneous statements meet requirements of clarity and conciseness valued in conferences.

Significance

The student of technical communication must be conversant in many codes to work with disc and teleconferencing technologies. By working with others who are producing programs for these media he becomes a valuable member of a production team because of his ability to communicate and because of his grasp of technical subject matter. Having "media literacy" enhances him as a communicator.

"Media literacy" is significant to the student of technical communication beyond additional competencies he gains as a communicator because the scope of the need for the technical and scientific information with which he works is big and getting bigger. Firms in the United States spend nearly $40 billion a year on training and education for their employees, compared to $60 billion for all of higher education. Some high tech companies budget 15-20% of a worker's paid time for training and education[22] because "their need is dictated by the rapid obsolescence of tehnical information and by evolving production processes."[23] A study by the Massachusetts Institute of Technology reports that this is compounded by the fact that the half-life of an engineer's knowledge is five years, so that half of what he learned in college is obsolete within five years of his graduation. This is such a significant problem that the average engineer should spend up to eighteen weeks a year upgrading his knowledge just to keep even.[24] Furthermore, the educators and researchers at colleges and universities who are the prime sources of much of this current knowledge are being depleted as they move to private industry or as they retire--so much so that there were 1,600 unfilled engineering faculty positions in 1980, rising to 2,000 unfilled faculty positions in 1984.[25]

But technical knowledge is critical at all levels of contemporary society as more and more sophisticated technology permeates virtually every job and home. Not only will high level technologists and scientists have to have current information with which to work, but so will technicians and consumers. With fewer educators in science and technology some methods are going to have to be utilized to better reach the students with new information and ideas. Right now those methods appear to be dominated by disc and teleconferencing media; projections show that fully interactive disc technology will grow to fifty times its present size--from 150,000 to 7,500 000 systems--by 1990, while over $2 billion annually will be invested in teleconferencing sales and services by 1990.[26] To cope with this and to meet the need for effective dissemination of technical information via these media, the student of technical communication must become media literate in these new technologies.

NOTES

1 There are varying levels of interactivity. The first, known as Level 1. involves pressing buttons on a keypad that comes with the disc player. The control is usually limited to going forward or backward, or searching for a particular frame location on the disc (each individual frame has a number, known as an "address"). Level 2 entails a program located on the disc, along with video and audio information. This program is loaded into the disc player's memory, where its microprocessor executes it. The program controls the player's actions, but also allows the player to accept input from the user. Based on the input, the player will branch to pertinent parts of the program according to the value associated with the input. Level 3 uses an external computer to control the disc, as well as to accept input. Programs at Level 3 vary in complexity depending on the size and capacity of the computer system. Some of the best systems generate computer graphics/text for viewing independent of the disc images or allow te superimposition of computer graphics/text over the disc images on the same monitor. William Fort, "A Primer on Interactive Video," AVideo, October 1984, 39.

2 The disc is composed of a polished aluminum skin laminated in plastic. The discs are manufactured in a dust-free plant.

3 Disc systems come in two varieties: Constant Angular Velocity (CAV) and Constant Linear Velocity (CLV). Only CAV discs are interactive because each video frame is embedded in a separate 360° track. Because each frame begins at the same place on the track, the player can move easily from one track to another to give random access to information. Because the frames are concentric, there's a finite distance between frames or tracks. Once the player knows the frame number from which it is starting, it calculates the distance needed to travel to a section very close to the frame number it is supposed to go to. Once the disc is close to the frame number it is supposed to go to, it moves precisely in searching for it. CLV discs, unlike CAV discs, have more frames on outer than inner tracks. Because the frames do not begin along the same radius, the player cannot identify any single frame, thereby making random access and still frames impossible. The main advantage of CLV discs is that they can be more densely formatted with up to an hour of video per side. A non-laser disc player was marketed by RCA. Called the Capacitance Electronic Disc (CED) system, it uses a video signal embedded in tens of thousands of fine grooves stamped into the surface of a conductive

(carbon-doped) vinyl disc. The disc is read like a phonograph record by a diamond stylus that senses variations along the continuous spiral groove as fluctuations in capacitance. This system is used almost exclusively for linear programs, such as feature-length movies. Fort, "A Primer on Interactive Video," 40 and Richard L. Currier, "Interacttive Videodisc Learning Systems," High Technology, November 1983, 52.

4 I use the phrase "video monitor" rather than the word "television" since Level 3 interactive discs require an RGB (Red, Green, Blue: the primary colors in the video image) monitor. The RGB monitor can accept both the NTSC video signals that are produced by the video from the disc player (these are the same type of signals a home television receiver accepts) and the non-NTSC signals produced by the computer. "NTSC" stands for National Television Standards Committee, the group that sets the standards for video signals that are broadcast in the United States.

5 Currier, "Interactive Videodisc Learning Systems", 55.

6 Paul Mareth, "The Video Disc: Shining in a New Light," Channels of Communication, March/April 1984, 28.

7 Carroll G. Bowen, A Survey of Videodisc Applications in Industrial Training and Development (Cambridge, Massachusetts Kalba Bowen Associates, 1979), mimeograph.

8 Dwight B. Davis, "Interactive Videodiscs Turn the Corner in '83," High Technology, November 1983, 60 and Rockley L. Miller, "Optical Video Disc: the Laser's Edge," Channels of Communication, Field Guide '85, 19.

9 Elizabeth Wright, "Instructional Design for Videodisc Programming," University of Nebraska Videodisc Design/ Production Workshop, May 1984.

10 Rockley L. Miller, "Fourth Annual Interactive Technology Briefing," The Videodisc Monitor, January 1985, 14.

11 Marcia A. Zier, National Library of Medicine-Lister Hill, personal interview, May 1984.

12 Currier, "Interactive Videodisc Learning Systems," 58.

13 Roy Bernd, "A User's Perspective Army Communicative Technology Office," The Videodisc Monitor, January 1985, 16-17.

14 Mary Frost, "International Teleconferencing," International Television, March 1984, 54.

15 "Videoconferencing Report," Educational and Industrial Television, April 1985, 22.

16 "Telemeetings and TV Dinners," Audio-Visual Communications, August 1983, 16.

17 "Videoconferencing Report," Educational and Industrial Television, June 1983, 24.

18 "Videoconferencing Report," Educational and Industrial Television, November 1984, 54. For discussions of the teleconferencing services offered by various companies, see "Companies that Do Teleconferences," Educational and Industrial Television, July 1981, 33 and "Videoconferencing Report " Videography, May 1983, 28.

19 For examples of the many productions for science and technology see Videodisc Design/Production Group News, February 1984 and February 1985; Video Computing, January 1985; and the monthly "Videoconferencing Report" in Educational and Industrial Television.

20 The term "techno/peasant" was coined by a group of scientists in 1979. The techno/peasants are the "new masses who have no idea what's going on inside the techno/system" while the technocrats are "a scientific elite who are really running things." The Techno/ Peasant Survival Manual (New York: Bantam Books, 1980).

21 "Consumer technology" is the day-to-day technology the average individual has to cope with on a regular basis. As the technological level of society's products rises the complexity of and knowledge required to work with consumer technology rises.

22 Ezra Bowen "Schooling for Survival," Time, February 11, 1985, 74-75.

23 Carroll G. Bowen, A Survey of Videodisc Applications in Industrial Training and Development, 1.

24 "Are Whizzes Washed Up at 35?," Time, October 18, 1982, 100 and Jon McIntosh, "High Stakes in Lifelong Education," Technology Review, January 1983, 81.

25 Ronald Fannin, Associate Dean, School of Engineering, University of Missour-Rolla, personal interview, January 1985

26 Willard Thomas and Cinda Thomas, "Investment Trends in Teleconferencing," Educational and Industrial Television, August 1982, 35 and Davis, "Interactive Videodiscs Turn the Corner in '83," 60.

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VISUAL RHETORIC IN TECHNICAL COMMUNICATION

PART 1: THEORETICAL, EMPIRICAL AND INTUITIVE BASES

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We are all familiar with C. P. Snow's notion of the "two-cultures syndrome" underlying the malaise of Western civilization.[1] Snow, you will recall, divided people into two camps: in one camp he placed scientists and technicians, who lack humanistic training; in another camp humanists, who lack scientific and technical knowledge. Less familiar, but more relevant to our purposes here, is Rudolf Arnheim's 1969 version of the division:

> The lack of visual training in the sciences and technology on the one hand and the artist's neglect of, or even contempt for, the beautiful and vital task of making the world of facts visible to the enquiring mind, strikes me, by the way, as a much more serious ailment of our civilization than the "cultural divide" to which C. P. Snow drew so much public attention some time ago.[2]

For Arnheim, the "cultural divide" originates in "the widespread neglect of art at all levels of our educational system."[3] An eloquent indictment, indeed, but one that carries a mantle too broad for technical communication specialists alone to assume To reduce this charge to more manageable terms, let us consider its implications for technical communication specialists servicing technical students at the college level. Not that the residual problems are small. Extolling the symbiotic relation between technology and the visual arts in Renaissance engineering, Eugene Ferguson laments the subsequent decline in visual acumen of technologists, including technical faculty.[4] More importantly for technical communication teachers, he sees the history of engineering, in particular, as marked by a progressive abandonment of instruction in the visualizing faculty and a concomitant privileging of new analytical techniques. The dropping of mechanical drawing instruction and the progressive devaluation of design courses are but the slightest symptoms of a trend that Ferguson decries.

Like the technical faculty, rhetoricians have eschewed visual instruction. Coming as most do with backgrounds in English Departments, they privilege the written word, lack visual training and have an underdeveloped appreciation of the visual component of communication.[5] It is no surprise, then, that the literature and textbooks of rhetoric typically fail to address the visual. We technical communication instructors, too, typically privilege the written word and suffer from lack of visual training; nevertheless, and however uneasily, we feel an inescapable obligation to deal with the visuals abounding in scientific and technical texts. How well are we discharging this obligation--an obligation that will mount as we swiftly enter the computer era? A compelling question, for the proliferation of low-cost, easy-to-use graphics software on computers is increasingly placing graphics production in the hands of technical professionals, rather than illustrators. Moreover, figurative modes of representation are increasingly needed by technical professionals to deal with the information explosion induced by the computer revolution. Thus, the ascendance of the visual mode, coupled with the relative impoverishment of the visual faculty, is aggravating the pedagogical problem to crisis proportions.

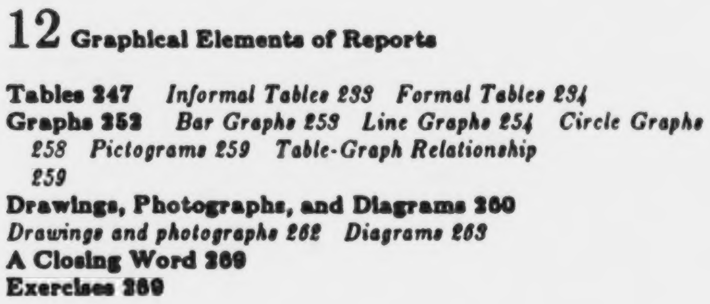
We assess this problem in the following remarks, through a critique of approaches to visual instruction in our pedagogical materials--materials that are pre-computer in conception. In a companion paper, we consider how the identified difficulties will be affected as we enter the computer era and close with suggestions for improving visual instruction in technical communication courses.

Critique of Pedagogical Materials on Visual Aids

Despite the lip service occasionally paid to the importance of visuals, even in a pre-computer era, clear evidence remains of their *de facto* devaluation in technical-communication courses and texts. In *quantitative* terms, we estimate--based on examination of syllabi and conversations with technical communication instructors--that class time devoted to visual instruction is usually confined to one week of a semester course. Evidence of a negative bias may also be seen in pedagogical materials[6]: A recent anthology of 21 articles on technical communication pedagogy includes only one article devoted to visuals; other anthologies neglect them entirely.[7] A chapter on visuals is conspicuously absent from the teacher's guide for one popular textbook.[8] More generally, an examination of page-counts for textbook materials dealing with verbal and visual elements yields a ratio of at least 20:1. When we contrast this ratio with the analogous ratio for professional reports--perhaps 4:1--the devaluation of visuals is further evidenced. The contrast is especially dramatic given the general feeling that visuals are underused by technical report writers.[9]

Not that an indictment in such quantitative terms suffices; a more serious indictment emerges from a *qualitative* examination of visual instruction materials in technical communication literature and textbooks. How may these materials be characterized? First, the treatment of visuals in much pedagogical material is highly empirical. The strong empirical cast is most easily seen in materials reflecting a "genre" approach to visuals. Such an approach is based on organizing instructional materials according to the kinds of visuals commonly found in experience rather than, say, according to principles of visual rhetoric. Characteristic of early textbooks and journal articles, the genre approach still prevails in current materials. It is reflected, for example, in the excerpt in Figure 1 from the table of contents of the most recent edition of a popular textbook.[10] The page numbers associated with the various topics serve in affirming the emphasis on genre-specific materials. More important, of course, is the treatment of materials thus organized by genre. Here, Philippe Duchastel offers a telling distinction. Analyzing audio-visual research on pictures based on taxonomic frameworks, he distinguishes between *morphological* approaches--those based on physical attributes, i.e., on "what a picture *looks like*" --and *functional* approaches--those based on "what a picture *does* in its particular context."[11] Pointing out the impoverishment of the morphological approach, Duchastel recommends a shift in research from the morphological to the functional approach. His recommendation is clearly extendable to pedagogical approaches to visual materials in technical communication.

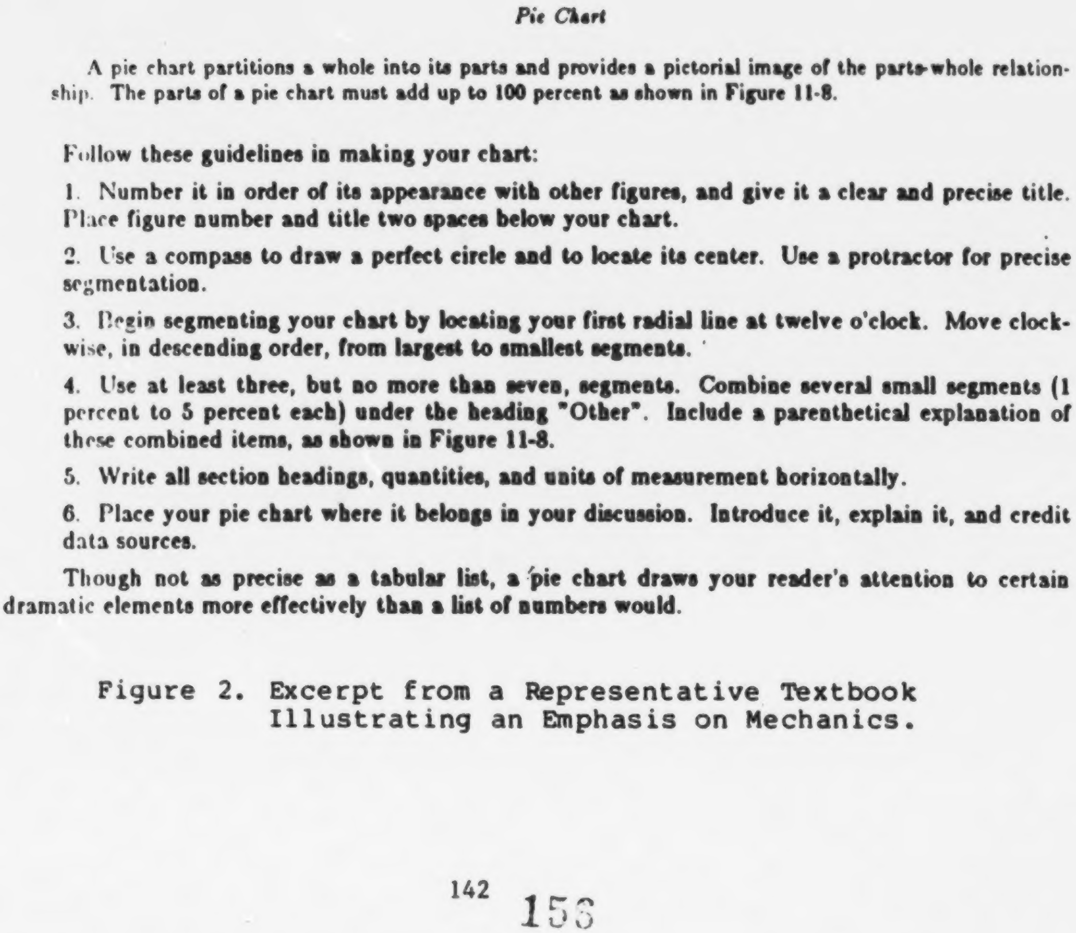
Second, the treatment of visuals in most pedagogical materials is strongly *ad hoc*, behaviorist and atheoretical. Surveying the audio-visual literature, Arnheim comments that the treatment of visuals consists largely of "perfunctory" recommendations.[12] Since the literature on visuals in the technical communication field draws heavily on the audio-visual literature, it is not surprising that the same may be said of the treatment of visuals in the technical communication literature. Thus, we find that the treatment of visuals often consists of an *ad hoc* series of guidelines whose rationale, or theoretical basis, remains obscure. Furthermore, the frequent omission of the purposive element underlying the guidelines lends a strong behaviorist cast to the treatment of visuals. The behaviorist cast is further enhanced by an emphasis on mechanics, that is, on rules for constructing visuals. As an example drawn from technical communication textbooks, consider the treatment of



12 Graphical Elements of Reports

Tables 247 *Informal Tables 233 Formal Tables 234*
Graphs 252 *Bar Graphs 253 Line Graphs 254 Circle Graphs 258 Pictograms 259 Table-Graph Relationship 259*
Drawings, Photographs, and Diagrams 260
Drawings and photographs 262 Diagrams 263
A Closing Word 269
Exercises 269

Figure 1. Outline of Visuals Chapter in a Representative Textbook Illustrating the Genre Approach.



Pie Chart

A pie chart partitions a whole into its parts and provides a pictorial image of the parts-whole relationship. The parts of a pie chart must add up to 100 percent as shown in Figure 11-8.

Follow these guidelines in making your chart:

1. Number it in order of its appearance with other figures, and give it a clear and precise title. Place figure number and title two spaces below your chart.
2. Use a compass to draw a perfect circle and to locate its center. Use a protractor for precise segmentation.
3. Begin segmenting your chart by locating your first radial line at twelve o'clock. Move clockwise, in descending order, from largest to smallest segments.
4. Use at least three, but no more than seven, segments. Combine several small segments (1 percent to 5 percent each) under the heading "Other". Include a parenthetical explanation of these combined items, as shown in Figure 11-8.
5. Write all section headings, quantities, and units of measurement horizontally.
6. Place your pie chart where it belongs in your discussion. Introduce it, explain it, and credit data sources.

Though not as precise as a tabular list, a pie chart draws your reader's attention to certain dramatic elements more effectively than a list of numbers would.

Figure 2. Excerpt from a Representative Textbook Illustrating an Emphasis on Mechanics.

pie charts in Figure 2.[13] Witness the clear concern for mechanics, e.g., the recommended use of a compass and a protractor for precision, the detailed rules for segmenting the chart, etc. Witness also the absence of a purposive element: Why should segmentation *necessarily* begin at twelve o'clock? Why use *at least* three, but *no more* than seven, segments? Why *must* segments be ranked in descending order, from largest to smallest? Because convention so dictates, to be sure, and convention is important. But convention is not enough, for without understanding the rationale underlying a given convention, one is prone to follow it blindly. Such a course would lead one, for example, to reject the chart in Figure 3. The chart was devised, for use in a hypothetical anti-trust suit, by the counsel for the independents of an industry. It admirably portrays the domination of the industry by its major manufacturers, who are represented collectively by the dominant chart segment. The impression of their domination of the independents, also shown collectively, would be strongly attenuated if the major manufacturers were represented individually. Therefore, the guideline requiring at least three segments is violated in the interests of rhetorical effectiveness. Displacement of the initial boundary of the largest segment from the recommended twelve-o'clock position is justified on the same basis. Thus, such displacement permits an iconographic similarity of the visual to a *face,* allowing the major manufacturers to be represented as "gobbling up" the independents. Our example suggests the potential danger in uncritically promoting *ad hoc* guidelines based on ill-understood conventions that may not reflect sound visual rhetoric.

The danger, moreover, is compounded by the problematic nature of visual conventions.[14] For conventions are *not* universal, as most textbook treatments imply; they are relative both within and among cultures.[15] Yet they are often perceived as having an absolute validity. This was Huck Finn's problem when, accustomed to a map on which the

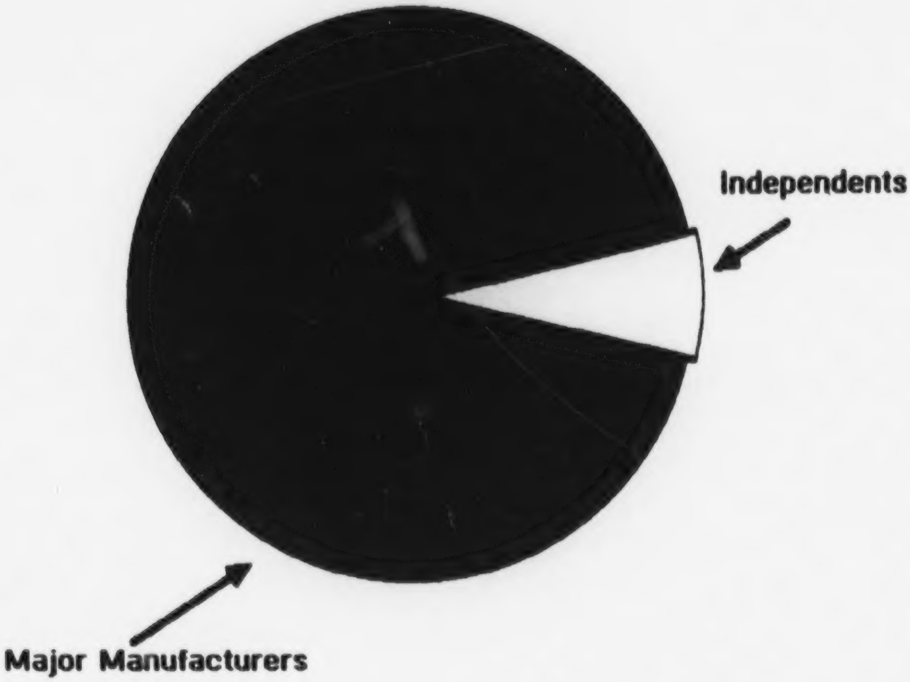


Figure 3. Pie Chart Illustrating Effective Violation of Published Guidelines.

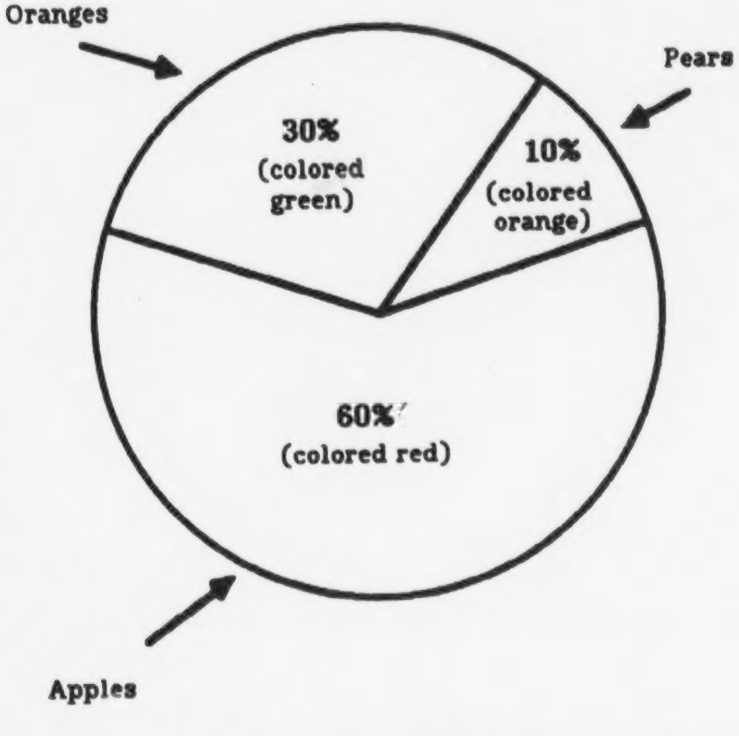


Figure 4. Pie Chart Eliciting Misreading Due to Conflicting Conventions.

states of Illinois and Indiana were represented in green and pink, respectively, he saw the verdant Indiana countryside below him during a balloon trip and exclaimed "*Illinois* is green, Indiana is *pink*. You show me any pink down there, if you can. No, Sir: it's green...there ain't no two states the same color."[16] Huck clearly does not understand the arbitrary nature of conventions. Our students are not all as literal as Huck, but most can be victimized by conflicting conventions. Consider the problem of conflicting conventions posed by the graph of Figure 4. Why should a significant number of students mistakenly recall a 10-percent contribution for oranges after brief exposure to this graph? The result no doubt originates in the conflict between the graphic convention, in which oranges are color-coded in green, and the convention brought from daily life, namely, that oranges are orange. We say convention, rather than reality, since oranges are orange largely as a matter of cultural consensus--a consensus fostered by the systematic use of artificial coloring. (Shades of Huck Finn?) The problem of conflicting conventions is even more acute from a cross-cultural perspective. Again, take color-coding conventions in illustration: Danger is coded with red in the United States, but with blue in France. Similarly, white is associated with weddings in the West, but with funerals in the East. The problem of conflicting conventions is not trivial, particularly in an era of growing international communications and trade. Our pedagogical materials remain dangerously mute on such issues.

But the danger does not end here. More threatening, perhaps, is the risk that current guidelines may meaningfully accord with neither theory nor experimental evidence. As an example of the former, psychologist and theorist Rudolf Arnheim calls for an appreciation of the intricacies of "pertinent perceptual principles" in addressing fundamental problems in the design of visuals.[17] In particular, he notes that "the manuals on audiovisual materials...tend to dispatch these fundamental problems with the perfunctory

159

recommendation that the pictures be neat, natural, and simple."[18] The recommendation that visuals be "neat, natural and simple" will have a familiar ring for technical communication specialists, whose textbooks are rife with such advice. Clearly, current theory of visuals requires re-validation, with appropriate revisions, of all such injunctions as "be simple."

As we have illustrated, the relation of current guidelines for visual design to theory is tenuous at best. What, now, of our claim that current guidelines may not accord with experimental evidence? Consider the following assertions by Robert Lefferts--assertions representative of the position taken in most technical communication textbooks and articles:

> Numbers and ideas presented graphically are often more easily understood, remembered, and integrated than when they are presented in narrative or tabular form. Descriptions, trends, relationships, and comparisons can be made more apparent. Less time is required to present and comprehend information when graphic methods are employed.[19]

The privileging of graphic over tabular representations takes an extreme form in the following dictum in a recently published article on graphics by Raymond Gust:

> . . . numbers are almost always difficult to comprehend and would be far better displayed in one of the other chart forms. Tabular charts should be used only to display information that cannot be shown in any other form....[20]

But such privileging of graphic representations may be too facile. What is the basis of such dicta? The conclusion of Gust's article provides a hint: "Designing effective presentation graphics," we are told, "really boils down to a matter of common sense."[21] However, common sense may not suffice for, while not definitive, experimental evidence suggests that the advice presented by Lefferts and Gust is at best shallow, at worst erroneous. The studies of both Washburne, and of Lusk and Kersnick, indicate that tables are superior to graphics for subjects asked to *look up* and *recall* specific data values.[22] Similarly, Vernon found tables superior to graphics for subjects required to *comprehend* demographic statistics.[23] In short, experimental research has already cast a shadow over pedagogical guidelines that all too often reflect bald convention based ultimately on "common sense," intuition, folk knowledge or fad.

Let us now adopt a broader, more familiar perspective, and examine the treatment of visuals in technical communication materials in relation to current rhetorical theory. The view of visual communication that emerges from an examination of technical communication textbooks and literature is overly narrow. Generally, visual communication is seen as an activity that takes place after the fact, after the "real work"--that is, the work of writing--is completed. The visuals themselves become supplementary renditions of extant verbal materials. In brief, visuals are seen not as process, but as product or, more aptly, as byproduct. The product view of visuals clearly underlies the following advice offered in the literature: "Don't make a chart until a focus sentence summarizing what you want the chart to say, or the pattern you wish to display, is created."[24] It is manifested in the teacher's manual for *Designing Technical Reports,* which suggests exercises requiring production of a visual based on verbal report materials. In the words of Mathes and Stevenson: " · · · give your students a passage of text which demands a visual aid and ... ask them to prepare the sketch of that aid which they would submit to a technical illustrator."[25] In a pedagogical article on visuals, Beck and Wallisch report executing this advice by presenting students with an exercise based on the following instructions: "Below are excerpts from five student reports. As your instructor directs, read an excerpt and design an appropriate visual on a separate piece of paper."[26] Textbooks are rife with product-oriented exercises.

The product view of visuals is manifested, moreover, at another level in textbooks. The typical relegation of visual instruction to a segregated, or dedicated, chapter is symptomatic of a failure to view communication as a holistic process involving both visual and verbal elements. Ironically, segregation of visual materials is universal, even among textbooks espousing a process view of communication. But visual communication *is* an integral part of communication activity, rather than a discrete component. Viewed as processual, visuals become tools for discovery, tools for the generation of ideas and for decision-making. Our pedagogical materials clearly do not reflect such a view.

But the product, or artifactual, view is only one index of the traditional approach to visuals--an approach that may be generally characterized as formalist or context-impoverished. Witness, for example, the emphasis on the syntactic and the semantic, rather than on the pragmatic, or rhetorical, aspect of visuals--to use an analogy borrowed from linguistics. In older textbooks, one finds little interest in such rhetorical elements as audience and purpose, to use the current "buzz words." In recent textbooks, one encounters an interest in audience and purpose in the descriptive materials on visuals; curiously, however, the interest is not sustained in the exercises following such discussions. Ironically, too, the recent interest in the psychology of visual perception--Gestalt psychology, in particular--has had the side effect of diverting attention from the laudable movement toward rhetorical concerns. For Gestalt psychology emphasizes the *intrinsically* expressive power of visual elements as perceived by a universalistically conceived viewer. As such, it remains concerned largely with the syntactic/semantic aspect of visual communication. Thus, due to the concern with *universal* principles of perception, approaches based on Gestalt psychology do not accommodate the communication needs of diverse audiences. The effect of such approaches is to impoverish the treatment of context, a central issue in modern technical communication theory. Gestalt psychology does not

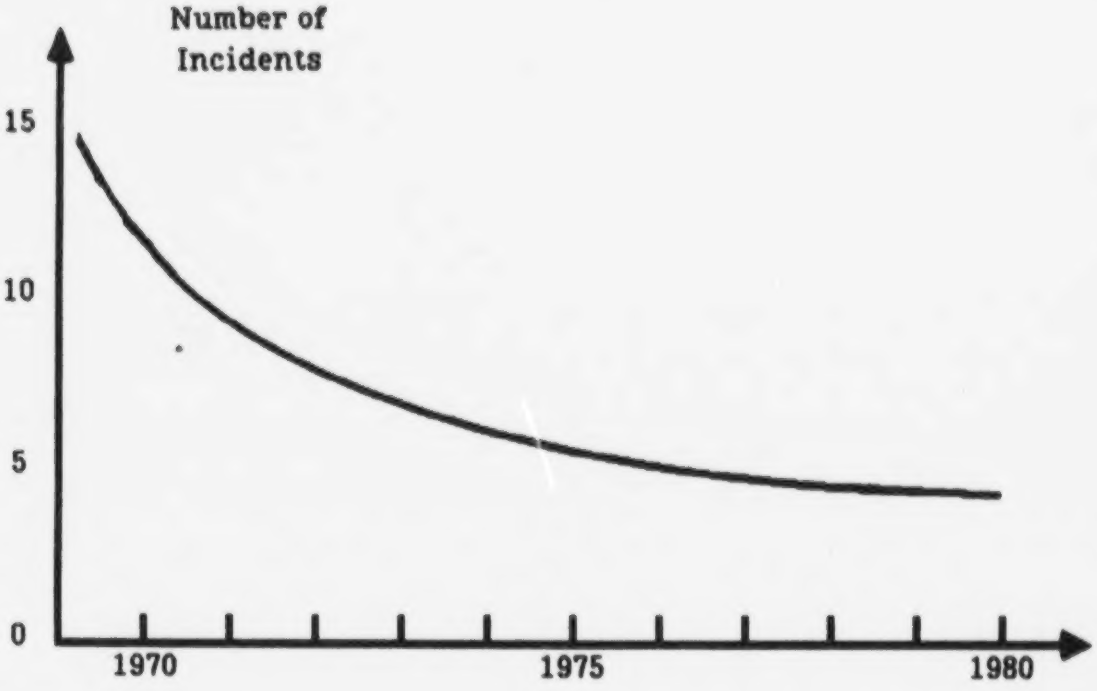


Figure A. Graph of incidents per year at Facility X over a ten-year period

Figure 5. Graph Illustrating Importance of Affective Component of Visual Communication.

address, for example, the issue of conflicting receptions of the visual in Figure 5. Conceived by a nuclear engineering student, the visual was designed to applaud the declining rate of deviant "incidents" at a nuclear power facility, and was so read by fellow nuclear-engineering students. Non-nuclear engineering students, on the other hand, offered a hostile reading: They interpreted the visual as documentation of the stubborn persistence of unacceptable errors in a problematic industry. The use of a more leading figure title, "Graph Showing Steady Decline of Incidents at Facility X," did little to abate the negative reception of the graph. Clearly, our pedagogy should address the issue of how visuals are received, not by idealized, universal audiences, but by representative classes of "real" viewers.

Lastly, context impoverishment in the treatment of visuals in technical communication courses is nowhere more blatant than in the failure of textbooks to deal with the computer revolution relentlessly underway. With the notable exception of an isolated, speculative paragraph in the textbook by Andrews and Blickle, visuals are placed in an increasingly anachronistic context, i.e., in a paper-based context.[27] Even in the technical communication literature one reads exclusively of *word* processing, and nothing of *image* processing. Yet visual processing may offer the only viable solution to the information explosion induced by the computer revolution. If a picture was worth a thousand words yesterday, it may well have to be worth a million words tomorrow. But that is the subject of the paper which follows.

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3. Arnheim, p.295. In a corroborating indictment of visual education, James L. Adams notes that "a great deal of effort has been put into [Stanford students'] verbal (and mathematical) abilities during their formal education, but little into their visual ability." *Conceptual Blockbusting: A Pleasurable Guide to Better Problem Solving* (San Francisco: San Francisco Book Co., Inc., 1976), p. 104. See also Robert H. McKim: "One-sided education in the 3 R's, with few exceptions, results in massive visual atrophy," *Experiences In Visual Thinking* (Monterey, CA: Brooks/Cole Publishing Co., 1972), p. 24 and J. Carter Brown, Director of the National Gallery of Art: "For all its other deficiencies, the American educational system has one in particular that gets continuingly overlooked. We persist in turning out students who remain visual illiterates." "Excellence and the Problem of Visual Literacy," *Design*, 85, no. 2 (1983), p. 12.

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12. Arnheim, p. 312.

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VISUAL RHETORIC IN TECHNICAL COMMUNICATION

PART 2: THE IMPACT OF THE COMPUTER

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Clearly, the rhetoric of visuals for the computer era has yet to be written. What would a computer age visual rhetoric look like? How would it relate to the traditional treatment of visuals, with its associated problems as characterized in the preceding paper? Any attempt at a finished portrait would clearly be premature, and is certainly beyond the scope of this paper. However, some implications of the computer revolution for visual instruction seem clear. Some problems traditionally addressed in visual instruction will be *alleviated:* In particular, the need for certain injunctions, e.g., the classical "be neat," will diminish as students are relieved of the burden of hand execution of visuals. In general, the focus on mechanics, characteristic of early treatments of visuals, will be even more misplaced. For if the professional earlier turned to an illustrator to generate visuals, he or she will now turn over the details of graphic production to a computer. Traditional guidelines for constructing graphics, once of instrumental value to students, will have only informational value.

Still other pedagogical problems will *change:* For example, our concern with the characteristic under-use of visuals in student reports may well give way to its opposite.

Engineering students at the University of Michigan are already producing their reports on the Computer-Aided Engineering Network (CAEN) using Lisas, Apollos, Macintoshes and IBM PCs. Reports generated in this computer-saturated environment show "an enormous increase in the use of figures and graphics."[1] Unfortunately, the visuals produced are not always necessary or meaningful: One of our students, for example, claimed that his modification of a machine increased its output from 36 to 38 units per hour. His two-bar graph (Figure 1) supplementing this assertion was clearly unnecessary. In other instances, the graphs produced with seductive ease on computers are not meaningful. Consider the pie chart of Figure 2, taken from a student lab report and showing the percentage of transistors with values of current gain β below, within and above the range specified by a manufacturer. Without a knowledge of sample size, we are unsure whether two out of five units were outside the specification range, or 40 out of 100 units. In fact, the chart reflected results of measurements on a sample size of five that have little statistical significance. Moreover, reviewing graphics software packages for *professionals* on the IBM PC, Jack Bishop points out that it is too easy to produce "graphs that are visually interesting but statistically meaningless."[2] Assuredly, then, until the much needed expert systems for graphics are developed, we will continue to encounter such graphs in *student* reports.

Similarly, our concern with the characteristic under-determination of visuals in student reports--e.g., absence of captions, legends, axis labels or scales--may also give way to its opposite. Relieved of the burden of hand execution, the visuals of our students at Michigan are, in fact, now frequently over-determined. Note the gratuitous use of the third dimension in a student graph (Figure 3) produced on a Lisa. Ironically, the trend toward professional-quality student visuals fostered by the computer revolution merely exchanges one set of pedagogical problems for another. Not that the problem of over-

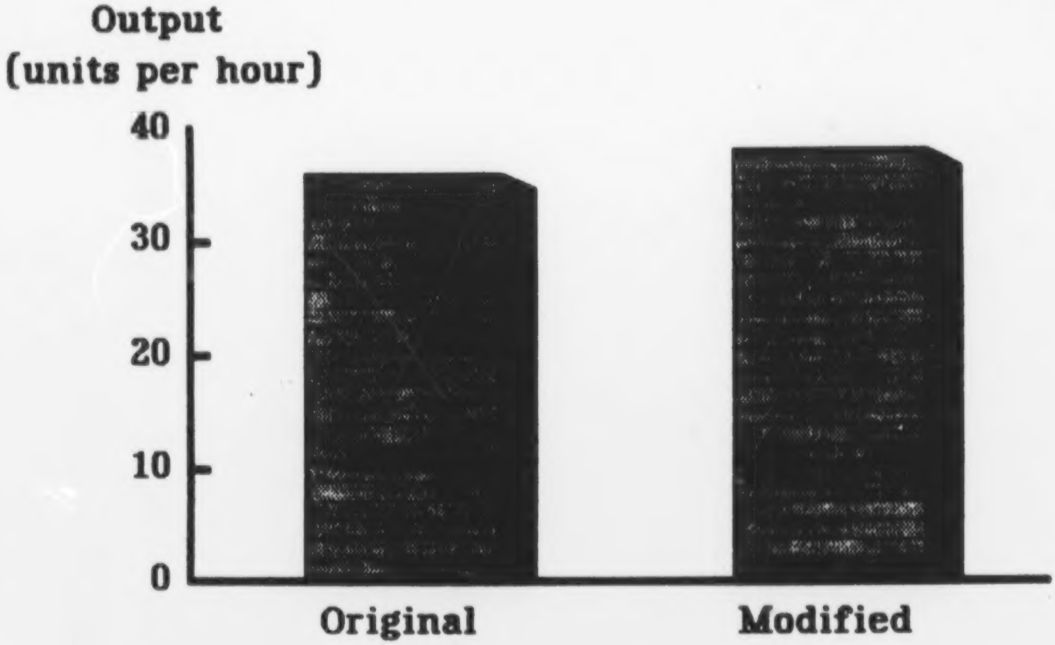

Figure 3. Comparison of Productivity Levels with Original and Modified Machine.

Figure 1. Example of Overuse of Visuals in Student Reports.

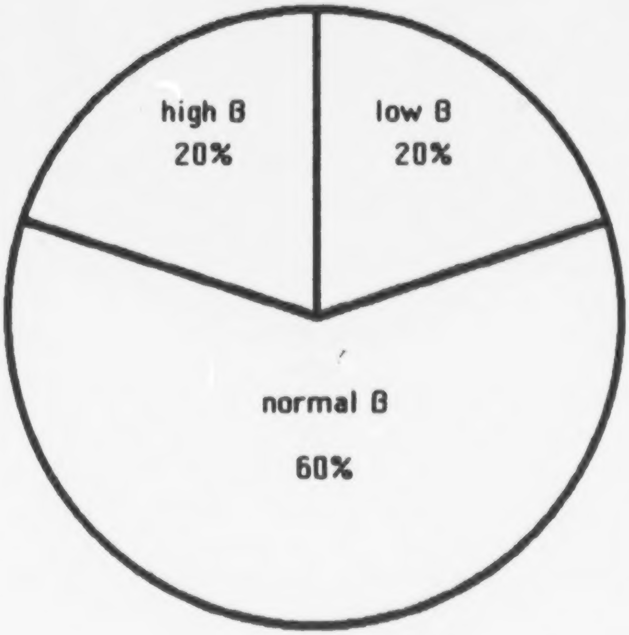

Figure 2. Example of Meaningless Visual in Student Reports.

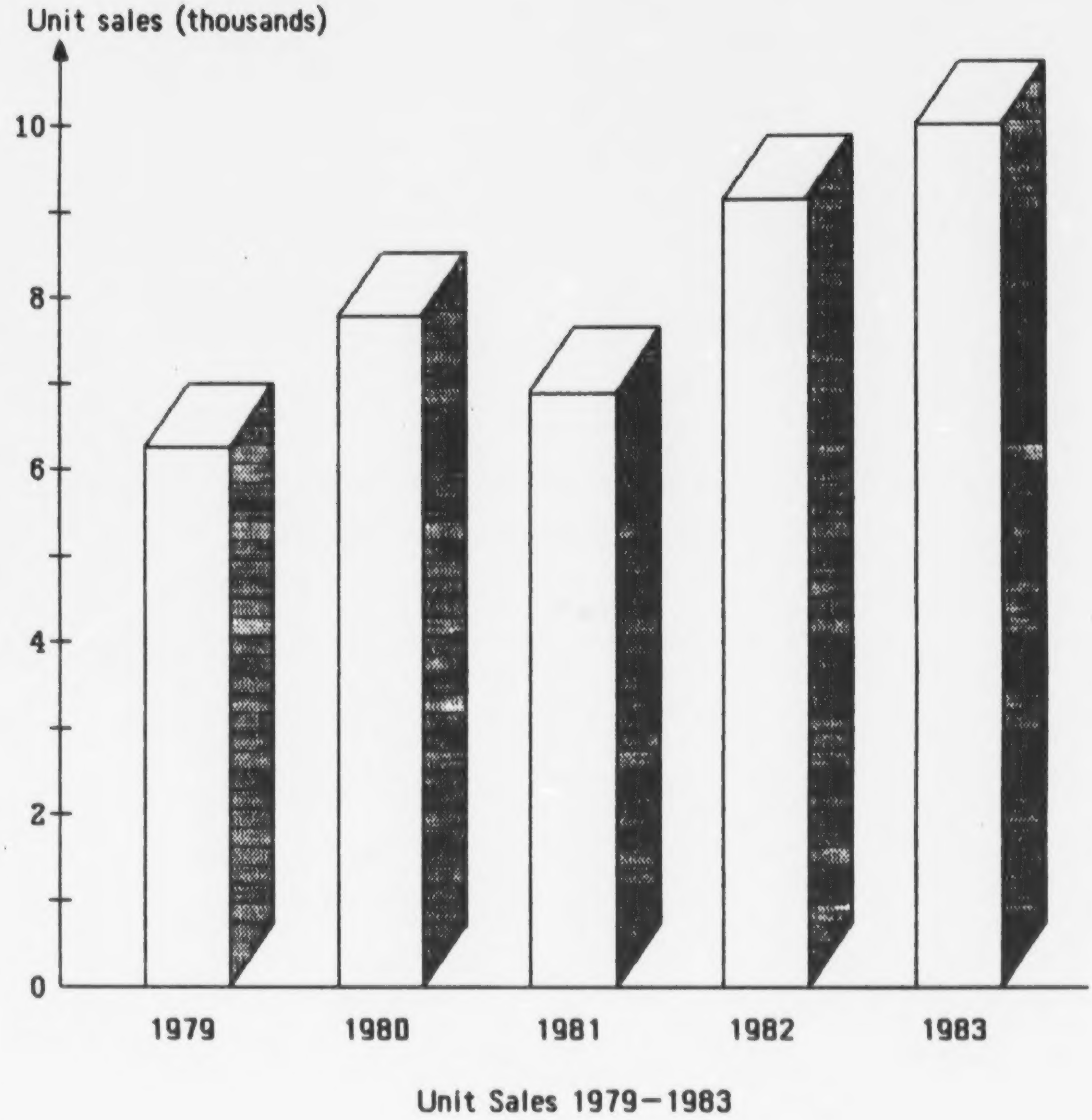

Figure 3. Example of Over-Determination in Computer-Generated Visuals.

determination is confined to *student* visuals; Tufte's chapter entitled "Chartjunk" provides numerous examples of over-determination in visuals produced by *professional* illustrators.[3]

Other problems addressed in visual instruction will *intensify* in the computer era. The palette of graphic options, or genres, regarded as standard in instruction will be seen as increasingly limited. We refer here to the palette of visuals seen as practical for *students* in the era of hand execution. Difficulty of execution led teachers, for example, to foster underuse of such potentially powerful genres as pictographs.[4] But bit-mapped graphics now permit a wide variety of pictographic elements to be easily defined and manipulated by a lay illustrator. Pictographs are, in fact, enjoying a revival in the representation of queuing problems. Moreover, recent research is establishing the promise for information processing of such new visual genres as Chernoff faces, fuzzy graphs and star charts.[5] Clearly, effective technical communication instruction for the computer age must encompass a broadened palette of visual genres.

Turning from visual genres to visual elements, we note that color, like pictographs, is frequently neglected or introduced apologetically in our teaching of visuals. Understandably so, since color--though recognized as a valuable rhetorical tool--was not seen, after all, as a viable option in student reports. But color graphics are now available at little extra cost for display, and at moderate cost for hard copy. Moreover, other advances in computer technology will facilitate exploitation of additional visual elements relatively neglected in traditional instruction: Thus, bit-mapped graphics enhance the viability of student use of such visual elements as texture and size, with important attendant advantages. Take size, for example. Visual symbols can now readily be produced in many sizes, thus facilitating the *concrete* representation of values. In contrast, practical considerations once dictated the frequent use of *abstract* symbols of the same size, interpreted with legends. In illustration, consider the symbolic representation of demographic information on the maps of Figure 4.[6] Note the abstract representation used in the traditional approach (Figure 4a), and the more concrete representation--based on elements of variable size--in Figure 4b. Jacques Bertin characterizes the distinction in terms of "reading maps" and "seeing maps," respectively.[7] His distinction, however, has wider utility. Those of us with literary backgrounds will recognize a parallel between Bertin's "seeing" and "reading" on the one hand, and Percy Lubbock's "showing" and "telling" on the other.[8] The main advantage of "showing" over "telling," or of "seeing" over "reading," is that "showing" elicits the reader's active participation in information processing. Such participation is invited through the use of concrete elements rather than abstract elements reflecting the author's imported perspective. Clearly, our pedagogy should exploit the enhanced rhetorical effectiveness of concrete visual representations facilitated by new computer technology.[9]

As a last example of pedagogical problems intensified in the computer age, we note the increasing untenability of the product view of visuals. For to ignore the processual nature of visuals is to spurn some of the most exciting current research on computer-based visuals as tools for discovery and decision-making.[10] The burgeoning fields of decision support systems (DSS) and applied control offer compelling testimony to the heuristic value of visuals for *generating* ideas. As the slightest example of the power of visuals as a tool for discovery, consider the computer graphics of Figure 5. Distributions in France of doctors, migrant workers and farmers are represented in the three black-and-white graphs, respectively, of the figure. Note that visual comparison of these maps is difficult: It is hard to find out, say, whether or not doctors and clients are equitably distributed. Such discoveries can readily be made, however, using so-called "synthesis maps," as Bertin has

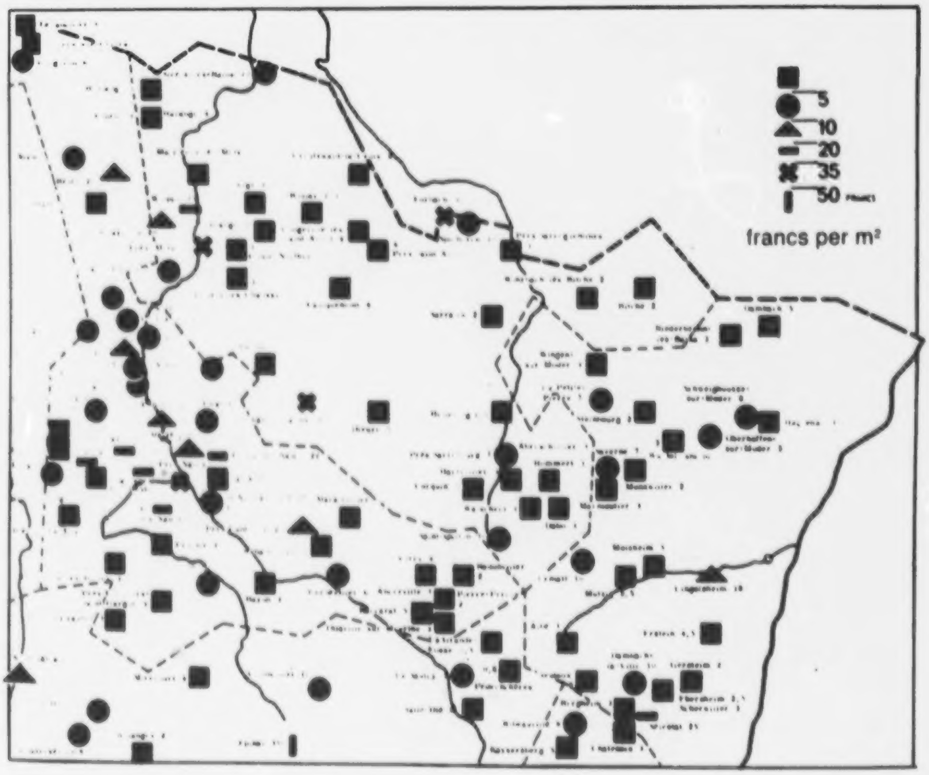
5
10
20
35
50 francs
francs per m²

Figure 4a. Illustrative Abstract Representation of Demographic Information on a "Reading Map."

5
10
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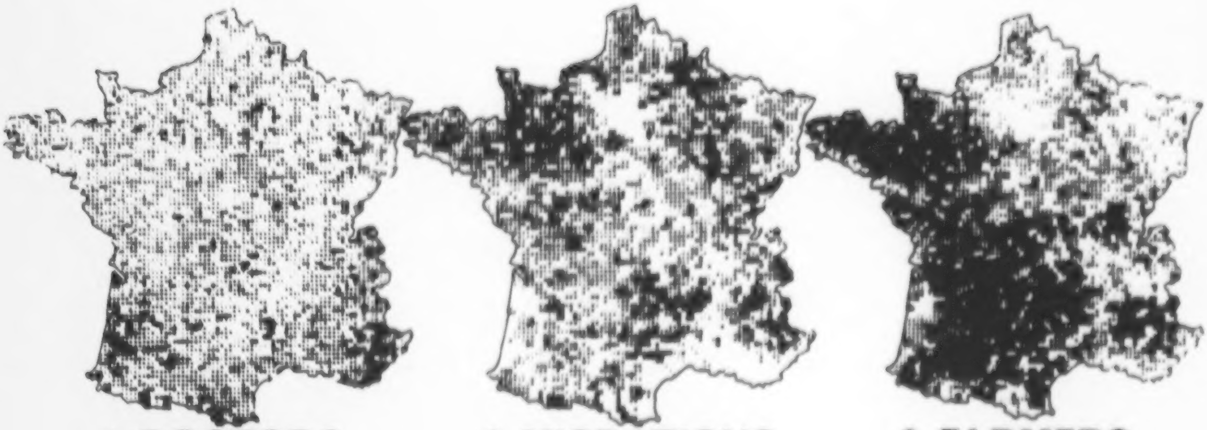
50 francs
francs per m²

Figure 4b. Illustrative Concrete Representation of Demographic Information on a "Seeing Map."



1. DOCTORS 2. MIGRATIONS 3. FARMERS

Figure 5. Distribution in France of doctors, migrants and farmers. Note the difficulty of comparative interpretations.

dramatically illustrated.[11] In one such map, distributions of doctors and migrants are superimposed, using red for doctors and blue for migrants. A mere glance then reveals a strong negative correlation for the locations of doctors and migrants, since the viewer sees mainly red or blue rather than a mixture of the two, i.e., violet. The distribution of farmers, represented with yellow, is added in a second graph, where three colors are superimposed. Again, a mere glance suffices to discover--from the noticeably orange regions--a positive correlation for the distributions of doctors and farmers in large regions of France. Yet, Bertin's *static* presentation of tri-chromatic superimpositions--however impressive--does not fully reveal their potential. Demographic information can be represented *dynamically* in accelerated displays to facilitate discovery of trends that are not easily discerned otherwise. Issues of visual, e.g., display, dynamics will become increasingly important in the computer era. In fact, developments in computer-related fields already cast serious doubt on the traditional privileging, in technical communication, of both product and static views of visuals.

Suggestions

Given our analysis of traditional treatments of visuals, and our speculations on the impact of the computer revolution, what suggestions can we offer the technical communication instructor? We suggest that the first step is to acknowledge problems with visual illiteracy among our students. We would refuse, then, to take solace in statements like the following:

> . . . technical students may already have a good idea about what makes a good visual: the world of advertising has subjected them to many examples, and their scientific courses have offered effective visuals dealing with theory and practice.[12]

For exposure alone, whether to visuals or to texts, does not produce literacy. Once we acknowledge the problem of visual illiteracy, we should deal with the implications, in the light of the undervaluing of visuals in our instructional materials. Thus, despite severely overburdened syllabi, we clearly need to increase visual instruction.

More significant, however, is the issue of the *nature*, rather than the quantity, of our visual instruction. We need to help our students on several levels. First, at the syntactic/semantic level, we must sensitize our students to the expressive power of visuals. To provide a needed corrective to their analytical, abstract orientation, we need exercises to develop their ability to maximize the load carried by the figurative component of the visual; in Bertin's terms, we need to develop their ability to use "seeing," as opposed to "reading," visuals. Principles of perception drawn from Gestalt psychology and its derivatives serve well here.

Second, at the pragmatic level, we should adopt a rhetorical, rather than a formal, approach to visuals. We favor a reader-response orientation, including enhanced concern for the affective component of visual communication. A purely formulaic presentation of conventions should be avoided by indicating their roots in perceptual and cognitive psychology as well as in cultural consensus.

Furthermore, we should supplement the fragmentary exercises used to sensitize students to visual elements and conventions by developing cases that fully contextualize visual communication for specific situations, settings, identifiable audiences, task environments and rhetorical purposes. Though current cases generally underprivilege visual communication, many may readily be adapted, nevertheless, to these ends. Moreover, since we need to teach visuals not only in a computer context, but *on* the computer, cases should be further adapted for computer implementation as discussed in our article in a forthcoming anthology of cases.[18] With our students on computers, we can justifiably divert the pedagogical effort increasingly misspent on mechanics to development of other skills; we can, for example, emphasize visual basics so students can discriminate among the graphics software packages flooding the market, or so they can appreciate the limitations of a given package.

Third, we should adopt a process view of visuals to accord with the process view of rhetoric most of us already endorse. In practical terms, this means seeding visual instruction throughout the course.[14] In particular, we need to introduce analytical graphics--as well as the presentation graphics exclusively taught in the past--during the instructional period devoted to rhetorical invention. We also need to deal with dynamic computer displays in addition to the static visuals treated heretofore.

A final observation. As instructors in visual communication we are limited by outdated pedagogical materials, and a textbook of visual rhetoric for the computer age has yet to be written. Our papers represent a modest beginning, but ultimately we are all limited by the state of the art in visual research and the *ad hoc* guidelines we now use clearly require *systematic* research validation. We should contribute to such research; but above all, we should contribute within a sound theoretical framework. Only then can expert systems for visuals be devised; only then can the *definitive* text on computer-based visual rhetoric be written. In the interim, much remains to be done and there are many windows in the house of visuals.

References

1. Donna Osgood, "A Computer on Every Desk," *Byte*, 9, no. 6 (1984), p. 172.

2. Jack Bishop, "Three Generations of Charts for the IBM PC," *Byte*, 8, no. 3 (1983), p. 358.

3. Edward R. Tufte, *The Visual Display of Quantitative Information* (Cheshire, CT: Graphics Press, 1983).

4. For an enthusiastic endorsement of the power of pictographs, especially for innumerate or lay viewers, see Michael Macdonald-Ross, "How Numbers are Shown: A Review of Research on the Presentation of Quantitative Data in Texts," *Audio-Visual Communication Review (AVCR)*, 25, no. 4 (1977), pp. 359-409. He attributes the heretofore restricted use of pictographs to difficulty of hand execution, but, as we note, such restrictions do not hold in the computer era.

5. Herman Chernoff, "Using Faces to Represent Points in k-Dimensional Space Graphically," *Journal of the American Statistical Assn.*, 68 (1973), pp. 361-68; A. P. Friedman, et al., "A Graphic Way of Describing Changing Multivariate Patterns," *Proceedings Sixth Annual Symposium on Computer Science Statistics*, Berkeley, CA (1972).

6. Jacques Bertin, *Sémiologie graphique*, 2nd ed. (Paris: Gauthier-Villars and Mouton, 1973), pp. 34-35.

7. Jacques Bertin, *Graphics and Graphic Information-Processing* (Berlin: Walter de Gruyter & Co., 1981), p. 147.

8. Percy Lubbock, *The Craft of Fiction* (London: Jonathan Cape, 1921).

9. The liberating effect of the new *computer* technology offers poetic justice. As Biderman notes, the older *print* technology has had important constraining effects on the conventions of text composition, e.g., segregation or framing of visuals (p. 235). In other respects, however, the communication instructor will not find the computer so beneficent. Thus, Paul Wallisch notes the tendency for engineering work to become more abstract and analytical under the impact of the computer. "The Engineer's Job: It Moves toward Abstraction," *IEEE Spectrum, 21*, no. 6 (1984), pp. 32-37.

10. See, for example, the work reported by John M. Chambers, et al.

11. Cost considerations permitted inclusion of only the black-and-white portions of Bertin's graphics in *Graphics and Graphic Information-Processing*, p. 162. The reader is encouraged to consult Bertin's text to see the impressive colored synthesis maps described briefly here.

12. Beck and Wallisch, p. 122-23.

13. Ben F. Barton and Marthalee S. Barton, "Modern Technology and Technical Communication: The Impact of the Personal Computer on the Case Method," in *The Case Method in Technical Communications: Theory and Models*, eds. R. John Brockmann, et al. (Association of Teachers of Technical Writing, forthcoming) pp. 71-85.

14. Cf. John S. Harris, who also advocates dispersing visual instruction over the term. Harris, however, does not espouse a process view in rhetorical instruction. He advocates, rather, a product view rooted in the rhetorical modes: Thus, "in the chapter

on hardware description, graphics of hardware should also be treated." "On Expanding the Definition of Technical Writing," *Journal of Technical Writing and Communication*, 8, no. 2 (1978), p. 135.

APPROACHES TO THEORIES OF GRAMMAR
AN UNEXAMINED CHAPTER IN TECHNICAL WRITING TEXTS

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I want to begin this paper with a quotation from Grammatical Man by Jeremy Campbell because I think its admonitory message partly applies to the technical communication field, particularly to our academic work:

> . . . a theory of language which concerns itself only with the surface appearance of the spoken or printed word has no hope of understanding its most important and essential properties. It misses the whole point of language as a human activity.[1]

In most areas of our work, his comment is off the mark. We have been very much concerned with human activity in technical communication and this concern has been the basis for most of our best scholarship, teaching, and contribution to the whole field of composition and communication. For example, our emphases on process, audience, the differing forms to contain technical content, the need for graphics and effective layout all reflect our understanding of the importance of the human situation in which communication occurs. We continually question traditional approaches to writing and test ideas equally for their theoretical and professional validity. But Campbell's statement does strike home, it seems to me, in our treatment of grammar.

In technical writing texts--and by inference courses and programs--issues of grammar are typically treated superficially

181

locally, as housekeeping matters, relegated to tidying up technical documents, with no fundamental influence on the interpretation and expression of technical content within a context. The rules that are presented are largely prescriptive and piecemeal rather than integral to the overall character and purpose of the document. A sign of this dismissal of grammar as a significant topic is its frequent placement in the back (even appendix) of technical writing texts. Indeed, one wonders that, if it weren't for the sales pressure of publishers to make textbooks catchalls for every level and topic of technical writing, authors would prefer to ignore the matter of grammar completely and leave it to traditional English handbooks, expecially good ones like Joseph Williams' Style: Ten Lessons in Clarity and Grace.

Two questions seem pertinent here which I shall try to answer: (1) why has grammar been treated in such a dismissive fashion, and (2) what does it matter? The first is rather obvious and understandable: we have tended to focus on those issues that are unique to our field--partly to distinguish our content from that in traditional composition texts and to avoid duplication of curriculum in the composition classroom; and partly, I believe, because we have not considered the topic of grammar to have any particular significance for technical writing. Style, yes, but not the rules that writers manipulate to achieve certain stylistic effects. If we are somehow successful in preventing our students from making syntactical errors, we feel we can move on to more interesting and pertinent matters.

What I want to suggest is that grammar--if understood and presented not as a static set of rules to be memorized and obeyed but as a comprehensive system of language whose rules can be applied to achieve a variety of functions--is at the heart of technical communication. This fundamental view of grammar can free us from an overly rigid adherence to any particular set of rules and allow us the range of linguistic expression necessary for interpreting and communicating technical information.

One of the debts modern linguistics owes to Noam Chomsky, whether or not his innatist theories of grammar are accepted, is his distinction between surface grammatical forms and a deeper structural pattern that governs our superficial speech. His theory of transformational grammar is based on two sets of rules: those that apply at the deep structure to create an abstract plan of a sentence and those that transform deep structure into surface structure, the level where a particular way of saying something occurs--where the abstract becomes audible.[2] But theories of language that have evolved from the work of the European structuralists appear to offer more insight into the question of grammar and its particular relation to technical discourse.

Seeking a comprehensive theory to describe all basic language acts, Kurszewski, Saussure, and Jakobson have contributed to the development of what is called the dual axes theory.[3] Like Chomsky, they are interested in what constitutes a universal grammar; however, they concentrate more on the basic activities that create patterns rather than the patterns themselves. In speech, they found, humans carry out two distinct acts: they select from a preexisting stock of linguistic units and combine their selection into more complex units. All discourse is created along the axis of selection--or paradigmatic axis--and the axis of combination--or syntagmatic axis (see Figure 1 on the next page).

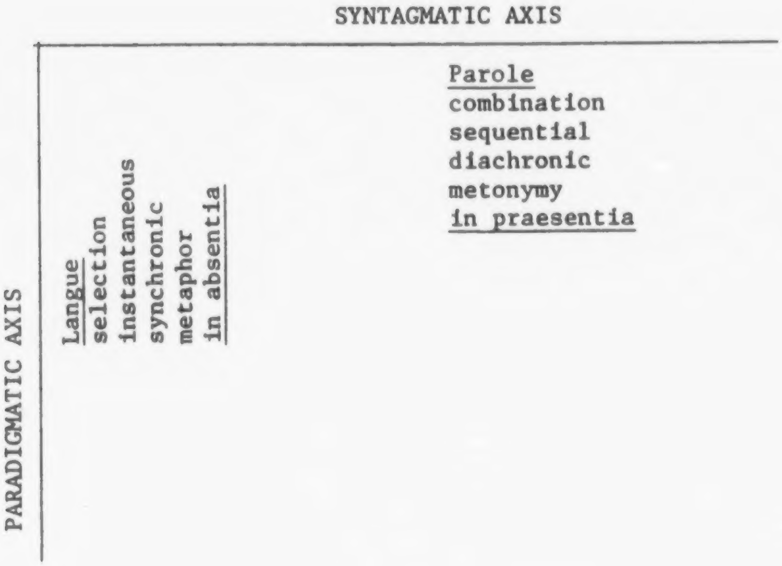
SYNTAGMATIC AXIS
Parole
combination
sequential
diachronic
metonymy
in praesentia
PARADIGMATIC AXIS
Langue
selection
instantaneous
synchronic
metaphor
in absentia

Figure 1. The Dual Axes of Language

The simplest sentence illustrates this highly complex and universal speech event:

The fat dog bit the boy.

By substituting one selection for another, one could vary the sentence almost indefinitely:

That obese animal ravaged my son.

or

His overweight hound chewed up that lad.

To create these variants of meaning, we choose a word from a series of words of the same kind and substitute it for another in the same syntactical location or, in other words, along the paradigmatic axis.

We can also change the relationship of the units along the syntagmatic axis for another kind of variety:

The fat boy bit the dog.

(shifting the kinds of words we draw from in each syntactical location) or

The boy was bit by the fat dog.

(shifting the syntactical arrangement). All of these actions are governed by rules; substitution or combination outside the rules of any particular language would produce jibberish:

Fat the dog boy the bit.

In fact, one of the fascinating observations by Jakobson is that aphasia, the loss of language, tends to fall into these two distinct patterns. Some aphastics lose the ability to produce meaningful substitutions, to use synonyms, or to make metalinguistic comment; whereas others cannot produce coherent discourse. These two disorders--similarity and contiguity would seem to confirm the presence and distinctiveness of these language acts.[4] Another interesting observation that has been made is that the combination of sections of discourse takes place through time whereas groupings along the paradigmatic axis appear as static and simultaneous occurrences.[5] Hence, Saussure's dichotomy of diachrony/synchrony pairs with the dynamic nature of the syntagmatic axis and the instantaneous nature of the paradigmatic.[6] Furthermore, Saussure associates his terms langue (code) with the paradigmatic and parole (message) with the syntagmatic, with the first as a relation in absentia and the second as a relation in praesentia.

Jakobson further distinguished these axes by assigning metaphor as the dominant figure of speech to the selection axis and metonymy to the combination axis. But in refining this distinction between poetic and everyday speech, Jakobson developed his theory of the functions of language which asserts that any speech event involves six actors: an addresser sends a message to the addressee; the message to be operative requires a context referred to, a code understood by both the addresser and addressee; and finally a contact, a physical and psychological channel allowing the two to come and stay in communication. "Each of these factors," Jakobson writes, "determines a different function of language"--the emotive which centers on the addressee, the referential on the context, the poetic on the message, the phatic on the contact, the metalingual on the code, and the conative on the addressee (see Figure 2 on the next page). He continues,

> Although we distinguish six basic aspects of language, we could, however, hardly find verbal messages that would fulfill only one function. The diversity lies not in a monopoly of some one of these several functions but in a different hierarchial order of function. The verbal structure of a message depends primarily on the predominant function. Even though a set . . .toward the referent, an orientation toward the context--briefly the so-called referential, "denotative," "cognitive" function--is the leading task of numerous messages, the accessory participation of the other functions in such messages must be taken into account by the observant linguist.[7]

This identification of six factors and matching linguistic functions universal to all discourse becomes important to our topic when we realize that to achieve a particular function, we characteristically draw on particular grammatical patterns. Or, in other words, we have six separate grammars at this secondary level, as well as the most basic grammar of the dual axes. This system of rules governing

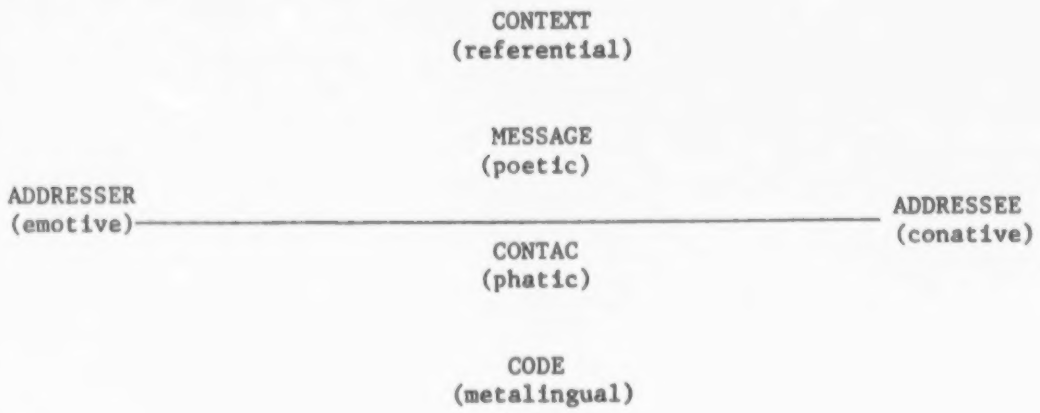

Figure 2. The Six Factors and Functions of Language

rules provides what Nauta, in his book The Meaning of Information, calls "GRAMMATICAL STRUCTURE or 'meta-regulator': an organizational structure for the proper development [and, we might add, application] of rules."[8] For example, when we want to focus on the context, or the object, and omit reference to the addresser, or the subject--as we frequently do in technical discourse--we rely heavily on the passive construction:

Copper alloy has been found to have superior strength.

in preference to

We have found copper alloy to have superior strength.

When emphasis is wanted, instead, on the addressee, as in the case of instructions, the imperative structure should be chosen as the dominant pattern:

Set the dial on 98°C.

When we shift to the declarative pattern within the instructions, it should be when we want to emphasize for the moment information about the object separate from the addressee's involvement with the object:

This dial is usually set at this high a temperature in order to achieve uniform cell divisions.

This shift in emphasis occurs by exchanging one grammar for another.

In other technical communications, the addresser, or subject, evokes the emotive function with the characteristic "I feel that . . ." or "We believe that . . ." pattern to appropriately express attitudes about the context or perhaps the addressee. The synchronic processes of elucidation and comparison for purpose of clarifying the message can often be served best by resorting to metaphoric constructions, either overt or embedded, in the syntactical line: "a trunk of a tree is like a straw, sucking nourishment from the soil to its leaves" or "the meat of the argument."[9] In these last two examples, one can see the different functions operating in hierarchy--the poetic serving the referential.

Understanding this rich interplay of functions that goes on even in technical communication can provide preliminary answers to my original question about the importance of grammar. First, it suggests the mistakenness of teaching grammatical rules out of the context of a communication situation. Even the most seemingly safe advice, applied in the wrong place, can prove misleading. On the issue of nominalization, for example, Williams writes, "Although we cannot always express crucial action in verbs, in the clearest and most vigorous sentences, we usually do."[10] Consequently, in a science article on evolution directed to lay readers, such advice might lead the writer to choose the less memorable sentence

Species are selected by evolutionary processes.

over the more metaphorically vivid

Selection is the engine of evolution.

to avoid the nominalization. Yet nominalizing the verb select is exactly what is necessary in order to create the metaphor "engine of evolution." Such a context-free approach to grammar separates the purpose and meaning of a message from its grammatical form. Knowing the rules is important to good writing; knowing when to apply them is equally so.

Secondly, this functional model provides a holistic view, a systems view if you will, of language, which insists on the elegance of logic, rather than a panoply of aesthetic judgments. Within this view, the rules of grammar can be seen as necessary mechanisms for achieving desired effects, not as a mysterious set of traps to ensnare the unwary. All of us are aware of the fears and insecurities that plague our students about using language, and their not very secret suspicion that the "rules" are simply the collected prejudices of a particular teacher. We have done so well to dispell these attitudes in so many areas of technical writing, it's time to bring the teaching of grammar into our canon of success.

NOTES

[1] Jeremy Campbell, Grammatical Man: Information, Entropy, Language, and Life (New York: Simon & Schuster, 1982), p. 159.

[2] For a fuller understanding of not only Chomsky's theory of transformational grammar but also its change over a period of time, see Syntactic Structures (The Hague: Mouton, 1957) and Aspects of the Theory of Syntax (The Hague: Mouton, 1965).

[3] For a good history of this development, see Elmar Holenstein, Roman Jakobson's Approach to Language: Phenomenological Structuralism (Bloomington: Indiana Univ. Press, 1976). See particularly "Perspectives of a Comprehensive Theory of Language" (Ch. 3), pp. 137-191.

[4] Roman Jakobson and Morris Halle, Fundamentals of Language (The Hague: Mouton, 1956), pp. 55-82.

[5] Holenstein, p. 142.

[6] Simon Clarke, The Foundations of Structuralism: A Critique of Levi Strauss and the Structuralist Movement (Totowa, N.J.: Barnes & Noble, 1981), pp. 119-129.

[7] from "Closing Statement: Linguistics and Poetics," Style in Language, ed. Thomas A. Sebeok (Cambridge, Mass.: M.I.T. Press, 1978), p. 353.

[8] Doede Nauta, Jr., The Meaning of Information (The Hague: Mouton, 1972), p. 48.

[9] Campbell, p. 250.

[10] Joseph Williams, Style: Ten Lessons in Clarity and Grace, 2nd ed. (Glenview, Ill.: Scott, Foresman, & Co., 1985), pp. 9-10.

TECHNICAL WRITING AND THE VULGATE

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It would be a great public good if all people who understand matters technical and scientific could write about them in clear, compact English, and not just any variety of English but a sort to which everyone might have common access regardless of his own local and familiar usages. A standard written English is of course what I am talking about, but the idea of a standard, as well as due attention to written English, has become somewhat muddled among us, especially among some language and composition specialists of various kinds: "There has been some discussion of late," as John H. Fisher writes, "among descriptive linguists and socio-linguists as to the nature of 'standard' English, the one tending to deny the existence of a standard because of variations in the spoken language, and the other arguing that the standard language is an elitist shibboleth erected to perpetuate the authority of the dominant culture. Neither of these positions recognizes the historical fact that in every society there is a formal, official language in which business is carried on, which is different from the various casual dialects of familiar exchange."[1]

If a writing program is to have any value at all it must at least know what that formal, official language is, know what is correct and incorrect in the written form of the language. The requirement, however, is not so easy to fulfill as it may sound. Even textbooks on writing nowadays reflect doubts. One major text contains the remark that only a pedant would insist upon distinguishing the proper uses of the prepositions between and among. The author of that textbook, as one critic said, should be shot among the eyes. Most textbooks and handbooks on writing do, more or less, maintain the idea of correctness, and there is wide agreement among them as to what constitutes error, as John Algeo discovered when he surveyed the most widely used of them.[2] But he seems unhappy with his discovery and refers to the rules of correctness as "Modern Shibboleths."

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[1] John H. Fisher, "Chancery and the Emergence of Standard Written English in the Fifteenth Century," Speculum 52 (1977), 883.

A few years ago an author of textbooks on writing compiled or devised a list of one hundred sentences, each of which contained an error in standard usage such as the handbooks proscribe. She sent the list to doctors, lawyers, architects, and other professional people with the request that they specify the degree of their objections to each error. She found that they objected a good deal more violently than most writing teachers do. In our society as in others, apparently, people do believe in or at least desire a standard language.

But the English language, particularly in America, is now in what George Steiner calls a stage of "aquisitiveness" and consequent "instability."[3] It is being written, and published, by people who do not know what formal written prose looks like. Colloquial diction and the loose formulations of small talk and intimate conversation have so invaded the written idiom as to destabilize it. As a result, people today who wish to write good scientific and technical English are in a situation not entirely unlike that of their counterparts in England during the fourteenth and fifteenth centuries, when scientific and technical topics first began to be written about in English. The complaint of one fifteenth-century commentator might almost be echoed with justice today: the language is "not stabli and foundamentali written."[4]

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[2] "Grammatical Usage: Modern Shibboleths," in James B. McMillan: Essays in Linguistics by His Friends and Colleagues, ed. James Raymond and I. Willis Russell (University, Alabama, 1977) pp. 153-171.

[3] After Babel (New York, 1975), p. 20.

Let us recall quite clearly the linguistic situation in late-fourteenth-century England. Geoffrey Chaucer's *Treatise on the Astrolabe*, *The Equatorie of Planetis* which may also be Chaucer's, and a few anonymous manuscripts constitute the whole body of scientific and technical writing in the vernacular before the year 1400. French, having been the official language of government and the unofficial language of power since the Norman Conquest in 1066, was only beginning to yield place to the majority language of English. Latin had long been and would long continue to be the language of the universities of learning, especially in the sciences. As late as 1466 Sir John Fortescue noted that in English universities the sciences were not taught except in Latin. Fortescue, it is also worth noting, was writing in Latin when he said so. The later fourteenth century saw the first great flowering of English poetry, most of it written to entertain private patrons or please the tastes of courtly coteries. But informative prose which would appeal to a general audience had yet to be invented. It was one thing to write poetry for a special audience whose tastes and language were known, but now "the great body of rising middle class men and women of England, with money in their pockets and a little learning in their heads, were asking to be instructed," and something in the nature of a standard was therefore required.[5]

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[4] "Quoted in H.S. Bennett, *Chaucer and the Fifteench Century* (New York, 1947), p. 190.

It is instructive for us to note that the idea of "the king's English," with its implications of propriety and correctness, was first suggested, by Chaucer, not in a courtly performance for the king but in the Treatise on the Astrolabe, written for a ten-year-old, or for a general audience behind the polite fiction of a boy. It is further instructive to note how Chaucer composed the work. For the most part it is a translation of a Latin account of the astrolabe, an instrument for making astronomical observations and calculations; yet there is no reason to doubt that Chaucer knew perfectly well how to operate an astrolable. In all likelihood he possessed one of his own. Moreover he was an accomplished writer--but an accomplished writer of poetry, not of technical prose. What he needed and got from his Latin source was not information but a model of technical prose.

Chaucer's Treatise is the most famous piece of technical writing in Middle English, but its fame derives mostly from the fact that Chaucer wrote it rather than from any special merits it possesses. Even Chaucer's admirers recognize that it is "characterized by illogical constructions and paratactic style"[6] and deserves in general and label "perfunctory."[7] It also has the vices of referentless pronouns, dangling modifiers, and an overall looseness which it shares with other early English prose treatises. The nearest way to achieve a tightening, for which English technical writers strove with increasing success throughout the next century, was through translation or at least imitation of Latin, first because there were no comparable English models and second because there were no books on grammar and usage for English as there were for Latin.

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[5] Bennett, pp. 115f.

[6] Fisher, p. 886.

[7] George Philip Krapp, The Rise of English Prose (New York, 1915), p. 10.

If questions concerning grammatical forms presented problems, those concerning vocabulary were still more pressing. Even William Caxton had to decide whether to write eggs, the familiar term in some dialects, or eyren, the familiar term in others. But scientific and technical writers faced the far more severe challenge of constructing a language suitable to their purposes out of a vernacular which in certain parts of its vocabulary was seriously impoverished. Having been for centuries the uncultivated tongue of the illiterate masses, English simply lacked the terminology for dealing with science and technology. In deciding what to do about the impoverishment, writers could appeal to either of two contradictory theories of language, which may for simplicity's sake be called the rhetorical and the anti-rhetorical. The first assumes that meaning is radically independent of language and that a writer, having got his meaning in mind, is very free to find a language which suits his audience and his rhetorical purposes. The other identifies language much more closely with meaning, even assuming a formal identity or at least an inextricable connection between words and meaning. (A naive form of the latter theory lies behind the quip that a dodo bird is called a dodo bird because it looks like a dodo bird).

Chaucer comically invokes the rhetorical theory in a brief scientific passage in one of his poems, arguing that since hard language and hard subjects are difficult to understand at the same time, one should speak about science in illiterate language when addressing illiterate people.[8] He invokes the same theory in the "Prologue" to the Astrolabe, but in the body of the work he abandons it, introducing the necessary Latin scientific terminology in Anglicized form and elaborately explaining its meaning, realizing, as he says elsewhere (in a paraphrase of Plato), that the word must be cousin to the deed, that a thing must be called by its name.[9] His contemporaries and successors continued the practice of borrowing and inventing terms but increasingly contented themselves, by way of explanation, with a simple appositive gloss on the introduced terms, as in the phrases "incision or kittyng," "latitude" or "brede," and "fragile or able to be broken."[10] As the borrowed terms became familiar the glosses disappeared, and the writers had, by a compromise between the theories, succeeded in producing a vocabulary suitable to their needs.

It is clear that the developing standard English, though closely connected with the dialects of the London area, contained elements of other dialects and other languages as well and was in fact unlike any naturally spoken dialect. In the chancery records of the fifteenth century are revisions and emendations which betoken a growing sense of "correctness," one that shows itself in the removal of language appropriate to various forms of speech in favor of a uniform written language.

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[8] House of Fame, ll. 853-869.

[9] General Prologue to the Canterbury Tales, ll. 725-742.

[10] Trinity College, Cambridge, MS 0.5.26.

This written language is an invented thing, and especially for scientific and technical writers it is a thing invented under pressure of a need to write more impersonally than writers had done when they wrote with an eye constantly fixed on the personalities of their audiences and the main chance to present themselves in a favorable light. The power of rhetoric may be, as Werner Jaeger says, the "constant enemy" of philosophy and science,[11] but rhetorical habits are hard to break. Chaucer keeps his audience and himself continuously in mind, so that even in the Astrolabe the first- and second-person pronouns are ubiquitous: "Now I have told thee twice" is a representative formulation. But one of his anonymous contemporaries, who had advanced somewhat farther, writes, "We have written above, after the common use . . ."[12] Between the rigid requirements of their subject and the yeasty instability of the vernacular, "the common use" is what the early scientific and technical writers were achieving and what their modern counterparts must continue to achieve.

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[11] Paideia (New York, 1943), p:11.

[12] Trinity, Cambridge, MS 0.5.26.

THE *DE LINGUAE LATINAE ELEGANTIA* OF LORENZO VALLA AND THE TEACHING OF TECHNICAL WRITING

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While we all seem to know what we mean by the humanities, history offers two definitions, one of which is concerned with their essence, the other with their potential, and both historically comprehensible. The prevalent definition postulates that the humanities and humanism *are*, and specifically that they are a set of ideas, values, texts, and methods. Further, this set of things can be defined thru antonymy: whatever the humanities are (and any listing of the members of the set varies from authority to authority), they are definitely not the sciences. This use of humanism has been traced to the writings of F.J. Niethammer who, in 1808, coined the word *humanismus* to express "the emphasis on the Greek and Latin classics in secondary education, as against the rising demands for a more practical and scientific training" (Kristeller 9). Evident everywhere in the modern university, this definition is clearly operative in the long standing debates about who should teach technical writing, where it should be housed, and what it is or is not (see Mathes, Stevenson and Klaver; Miller; Hull; and Mitchell). Such a definition of the humanities as a set ideas, values, texts and methods is also shared by society at large, shaping their view of our curricula and its ends.

The ubiquity of this definition, however, obscures another to be found in the work of Paul Kristeller and Hans Baron, a concept of the humanities which has powerful implications for the teaching of technical writing. Kristeller persuasively demonstrates the *studia humaniora* was the Renaissance name for a new orientation and a new claim for the the teaching of the trivium, the "core curriculum" of both the medieval and Renaissance universities, composed of grammar, rhetoric, and dialectic or logic. The Renaissance definition of the humanities, however, did not simply delimit a set of things, but instead it placed its emphasis on the potential of such a set: that "new claim" of the Renaissance for that course of studies is expressed most persistently by Renaissance editors who justify their work as serving the "utilitas adoluscentuli." "Utilitas" translates literally as "use" but that sense of "use" is very specific among humanists. Francis Bacon typlifies the humanist position when he writes:

> Studies serve for delight, for ornament, and for ability. Their chief use for delight is in privateness and retiring; for ornament is in discourse; and for ability is in the judgment and disposition of business, for expert men can execute, and perhaps judge of particulars, but the general counsels and the plots and marshaling of affairs comes best from those that are learned. ... Crafty men contemn studies, simple men admire them, and wise men use them. (144)

Renaissance humanists, I suggest, made the new claim that their innovations would in fact enhance the efficacy of their students in the world: they believed that what they offered in their texts and in the curriculum built around those texts was justified not by the merit of the matter alone, but by the fact that such matter, because of s merits, would best promote the development of their students and make them better able to function in the society of the time. Renaissance educators such as Lorenzo Valla saw medieval linguistic practices as utterly barbarous impediments to the operations of society, and evolved a program of reforms: because classical Latin was the richest, most ubiquitous and most persistent language known to the humanistae, they proposed to teach only that rich and potentially universal form of the language and not the sloppy and fragmented medieval dialects, one favored at Bologna and another in the chancery at Florence and neither comprehensible elsewhere; and once the potentials of language achieved by classical writers became apparent, their style, and not the tortuously dialectical formulae of medieval dialogues, became the model for young students learning to express their ideas effectively.

Further, it is apparent that the humanists had specific goals in mind for their students, who could soon be found serving as secretaries to princes and cities or enjoying considerable success in business and politics. For Hans Baron, civic humanism, manifested by those Florentines who were prepared for active engagement in the tasks of their own age and state through a humanistic education, enabled the republic of Florence to survive the pressures exerted on it in the fourteenth century; William Bouwsma traces the same phenomenon in Venice, while Lauro Martines extends it throughout Renaissance Italy. Thus I can argue that Renaissance humanism, while manifested in major curricular reforms, was defined not merely by what it was but by what it could do and specifically, what it could ultimately do within the increasingly complex society of the time.

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200

My readings in Renaissance humanism may be colored by the realities I have experienced as a departmental chairman: in rereading Valla's Preface to the De linguae latinae elegantia, his trope of a "commonwealth of the mind" now seems more like the description of a prelapsarian world, in which, after the fall, English Departments were formed in punishment for our sins. A closer reading, however, reveals that Valla and his fellow humanists took the idea of a commonwealth quite seriously, so seriously that I would now argue that it lies at the center of their new claim for the traditional study of grammar, rhetoric, and dialectic. Although his manipulation of the image of Rome is a rhetorical tour de force, Valla treats a central truth: while empires are subject to dissolution, a common language can transcend territorial boundaries, temporal limits, and cultural barriers; in so doing, such a language creates an intellectual commonwealth wherein all who participate in the language can benefit from it and, through their fluent use of that language, benefit others as they have been benefited. Valla's claims for a common language are as valid today as they were then, for they have the same consequences: while it may be a small commonwealth, the fraternity of pilots and traffic air controllers depends for its common well being on a common language transcending those same barriers. Conversely, even while we in the modern university think that we speak a common language, our professional languages divide us by disciplines and prove, more often than not, to be inpenetrable barriers to intellectual unity.

While Valla was describing an intellectual commonwealth, other humanists were everywhere justifying their educational reforms as essential to the temporal commonwealth, even if it was a monarchy. While it was to be expected that Florentine republicans would evidence such a concern, given the political realities of the time, the same statement of purpose can be found ubiquitiously in literature written in and addressed to monarchies. For Renaissance humanists, the eloquence promoted by their curricular reforms and the respublica are inextricably linked; without the former, the latter was threatened with collapse. Arthur B. Ferguson argues that, in Tudor England, this inextricable linkage was demonstrably critical, arising out of

> ... the need for a governing class capable of adding the more complex duties of civil government and intelligent counsel (which had in fact for some time been taxing the limited intellectual resources of the English gentry) to the primarily protective, basically military function originally assigned to the knight. (185)

There was, in short, a societal void that could not be filled in traditional ways; the pace of change in the Renaissance had outstripped the resources of the traditional rulers. The educational reforms of the Renaissance humanists, however, had purposefully given their students access to two additional resources: a language which enabled them to communicate cogently with each other despite national and professional boundaries and, of equal importance, access to the largest single store of political, practical, and philosophical wisdom then available. Thus their students, and not the students at the Inns of Court, the chanceries, and the schools of philosophy, were ready to respond when the commonwealth required their unique services, even before they were asked.

In defining, as most of us do, the humanities as a set of things, we have lost the core of the Renaissance reforms and thus confront the modern world with only the shell and not the substance of these reforms; we may have maintained and augmented the body of knowledge they recovered, but we have lost their sense of purpose, for which there is now as great a need as there was then. I would suggest that the commonwealth as they defined it has thrived and in fact dominates our society and in this I have two unlikely allies, Roger Blough, the former chairman of U.S. Steel, and John Kenneth Galbraith. The former, speaking at Columbia as part of the McKinsey Lectures, described the modern corporation in terms that reverberate with Renaissance values:

> Now it is a notable characteristic of a free society that men will voluntarily join forces for their common welfare--material or spiritual--and that, of the many ways to improve human welfare, by all odds the voluntary route of group cooperation of like-minded individuals has proved to be the most effective. ... The essential purposes which man wants to, can, and must accomplish ... can only be achieved in our free societyif men cooperate in the doing--cooperate by forming groupsof individuals who undertake dissimilar parts of the workand who, by working together as a cohesive group, do achievean end result which society, as a whole, finds beneficial.... [T]he most highly developed and usefully employed means of voluntary cooperation is the corporation... By utilizing the corporate form, the group can acquire a size needed to initiate and accomplish modern-sized jobs, a task to which no other form of voluntary association lends itself so readily. And by corporate organization, the group can best ensure a continuity of existence. (6-7)

His widely shared view of modern American organizations provides a striking restatement of the Renaissance ideal of the commonwealth: a group bound together for a common good, addressing complex issues too great for any one individual to cope with, each member of which is expected to contribute to the best of his or her abilities. A decade later, Galbraith, in The New Industrial State, changes only one minor feature of Blough's vision, but in the process, makes the persistent centrality of the humanists' concerns even more explicit for the modern organization. According to Galbraith, the once dominant entrepreneur, the person who united ownership with the capacity for organizing the other factors of production, has been superseded in importance by a collective and imperfectly defined entity which extends beyond those normally recognized as management to include all

> who, as participants, contribute information to group decisions. This latter group is very large; it extends from the most senior officials of the corporation to where it meets, at the outer perimeter, the white and blue collar workers whose function is to conform more or less mechanically to instruction or routine. It embraces all who bring specialized knowledge, talent, or experience to group decision-making. This, not the management, is the guiding intelligence --the brain--of the enterprise. There is no name for all who participate in group decision making or the organization which they form. I propose to call this organization the Technostructure.(71)

As Galbraith makes clear in subsequent chapters, the modern organization depends upon an effective technostructure, and the effectiveness of a technostructure is in turn dependent upon the effectiveness of communication within it. While many may take exception to Galbraith's economic analyses, his structural analysis has come to be widely shared.

A recent survey conducted by UCLA and the American Council on Education revealed that college freshman first desire to be authorities in their chosen fields, and then to be financially well off, aspirations which may well explain the marked shift of college-age voters to the Republican Party in the last election. Students in technical writing courses, I suspect, have always had such Republican tendencies: they have selected curricula that both emphasize the mastery of the latest technologies and promise an above average salary upon graduation. My junior and senior students are, by and large, intent upon completing their degree and have given little thought to what will be expected of them as well remunerated "authorities in their fields" working in such organizations. Who will orient them to the technostructure? More importantly, who will identify and provide them with the skills they need to succeed (and not merely survive) within it? Their professional mentors have and will do their part by providing them with access to the information they will ultimately share and a comprehensive instruction in the mores of the discipline, to include its language, but they are ill-equipped to do much more, especially when they themselves are more attuned to the idiosyncratic structure of the university than they are to the technostructures to be found outside of our walls.

I suggest that we who teach technical writing from English Departments could do much more than we do if we would look beyond the set of things we use as our definition of the humanities to the purpose to which the Renaissance used that set of things. In order truly to realize our humanist heritage in the service of our students, we would first need to think through, with less passion and more equanimity, the issue of an English language comparable in in its universality to classical Latin; recognizing the complex relationship such a new Latin would have to each profession's vernacular, we could better teach our students how to take greatest advantage of each modality. In this, a task much like that confronting Renaissance humanists as they contemplated both a universal latin and functional vernaculars, progress has already been made through analyses such as that of Ruth Mitchell, but we can do more if we ourselves respect, understand, and have a command of those vernaculars commensurate with our mastery of the new Latin. It's not difficult: I think that I speak fluent geology, acquired long ago through the simple process of volunteering my services as an editor to my colleagues in that department and then listening carefully when they rejected some suggestions I had made while accepting others.

Even though its complexity was increasing, Renaissance society was still comparatively simple; thus the classical corpus used to model language, behavior, and ideas for students was satisfactory for their needs. This corpus, rigorously analyzed and copiously annotated, has no effective analog today, although I would argue, before a different audience, that literature of all ages could, and sometimes does, serve this function in some classrooms. First of all, any corpus we use in class must acknowledge the practices of the republic for which we are preparing students even as it goes beyond those practices. The journal article and the technical report are written for the ends of a discipline using the language and forms of that discipline; thus the teaching of such tasks is the province of each discipline. In the republic, however, the young professional will ultimately have to communicate, in both the new Latin and the vernaculars, in ways that have in common only the fact that they rarely have much in common. We must share Erasmus' view that "those who either require or prescribe one certain style in letters ... seem to me to treat that undoubtedly great multiplicity of subject matters, almost infinite in variety, too narrowly and briefly." We have, in our rhetorical tradition, the wherewithal to address this issue; we have only to use it in our classroom in place of prescription.

Further, we must address the fact that published collections of case studies for technical writing students are too few in number and dwarfed on the shelves by endless volumes of prescriptive advice. Further, the few that are available have had to be all things to all people in order to sell. Most importantly, the commentary does not approach, in either thoroughness or sophistication, that developed by Renaissance commentators. We have, however, in the critical tradition we have inherited from them, the wherewithal, when complemented by contemporary organizational and discourse analysis, to develop such commentary that sensitizes our students to that technostructure.

The fundamental problem, however, facing us in English Departments is our utter lack of a republican sensibility. The world of the university is nominally republican--"a community of scholars in pursuit of truth"--but is generally perceived as operating as a democracy or a tyranny, depending upon the issue of the moment and the manner in which it appears to be resolving itself. A professor is an independent professional who succeeds despite the demands of the organization. I have no ready answer to this most critical problem: a sabbatical spent in a large organization would be invaluable if approached properly, but that is, as yet, an uncommon opportunity. Rereading More or Quintilian or Cicero might help, at least a little. But perhaps I might suggest a more accessible starting point: the next time you attend a faculty committee meeting, reflect upon what might be accomplished if the university were to operate as a republic, consider the cost that such operations would extract from you (especially if your ideas did not prevail) and how you would cope with such costs. At the same time, try to identify how you would ultimately benefit, in the long run, from such a republican environment. If you can do this as an experienced professional and learn from that experience, you have something of great value to teach your students when they confront just such problems as members of a technostructure.

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ENGLISH LITERATURE AND TECHNICAL WRITING COURSES BOTH CONTAIN HUMANE CONTENT

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The Dichotomy Between Training and Educating

Department of English faculty members have taken sides, with the introduction of technical writing courses into the traditional, literature-oriented curriculum. One camp views technical writing as a subdiscipline in which instructors "train" students for specific jobs after graduation. These faculty contrast this training of students with the traditional function of English courses -- and other humanities courses -- to "educate" students.

Training, it is said, is a function of junior colleges and trade schools which instruct students for specific workplace tasks. For instance, in a Power Mechanics course, instructors teach students to perform a valve job, to disassemble a drive train, to install a clutch; missing from these particular courses of study is humane content or an emphasis on critical reading, analysis, aesthetics, and the like. Traditional faculty maintain that in humanities courses, particularly literature courses, instructors educate students in a much larger sense.

This dichotomy between training and educating transcends the dialogue within departments and surfaces in the board room of the university where administrators debate the same issue: Should the university respond to the specific technological/scientific needs of industry by modifying the curriculum? Administrators discuss advantages and disadvantages of doing so. On the one hand, tailoring curricula to the needs of industry may result in much needed funding; on the other hand, such changes may signal a capitulation of traditional humanistic goals. Either at the departmental, college, or university level, one may say that faculty and administrators believe in the traditional goal of the university to educate beyond parochial needs, and that industry because of time-profit exigencies concentrates on parochial needs.

The Truth of This Dilemma Is That No Dichotomy Exists

Basic to this training-educating controversy is a fear of the unknown by both academe and industry. On the one side, university administrators and faculty stereotype industry personnel as trained and task-oriented. Academicians fail to understand the vast, problem-solving process set in motion by a company's decision to respond, for instance, to the National Weather Service's request for a proposal to build an automated surface observing system. Over a period of months or years, the result of the company's response to the National Weather Service's request may be the development of sensing antennas, black boxes, software, and documentation to test, install, maintain, and operate the system. These specific, "hands-on" results have evolved from the employment of skills more often associated with humane content: The bulk of the effort of company executives, project managers, engineers, technical writers, and technicians, has focused on problem-solving, on analysis of client needs and the tasks involved, on classification of personnel and budget, on research into needed components and subsystems, and on communication among personnel and between personnel and client.

A team of company individuals works within this process, under the constraints of time and finite funding, and accomplishes the job because profit reigns supreme: profit forces problem-solving individuals to agree -- some would label it compromise. And therein may lie the rub: profit is not a clean, humane motive. Academicians distrust those who work purely for profit.

On the other hand, industry stereotypes academe as an ivory tower in which faculty perpetuate courses irrelevant to the mainstream of modern life. Of what value, for instance, are the writings of Geoffrey Chaucer, a medieval English poet? Why read Shakespeare's plays in 16th century English language versions? Are music and philosophy key courses in preparing students for the larger society and the workplace? Industry suspects academe of perpetuating these frills courses for the sake of foliating pasture for dinosaurs (faculty) to graze on.

Both industry and academe are confused:

* academe misunderstands the types of skills and kinds of knowledge industry's scientists, managers, and information processors need in order to succeed, and
* industry misunderstands the role of humanities courses -- or so-called frills courses -- in developing managerial expertise.

"Hands-On" Humanities: Literature Courses "Train" Technical Communicators

Interestingly enough, the humane content of literature courses translates into "hands-on" skills which ensure the success of technical communicators. In the last five years, industry has recognized the superior skills which humanities graduates bring to the field of technical writing; though, very few humanities-educated technical communicators have taken the time to examine exactly how their sensibilities were awakened and their skills honed.

The skills required for technical writing cannot be tied to knowledge of content; rather, such skills must be related to process. The understanding of this process is acquired by those students who concentrate their college study on English and humanities rather than on business and technology.

The education of business and technology majors is objective, whereas that of English majors is subjective. No right or wrong answer exists for an interpretation of a poem or novel, and any misinterpretation of a work of literature stems from inaccurate analysis, not from failure to find the right answer. Such differences form the basis of the skill the English major brings to technical writing: the ability to view a group of ideas as a decoding process consisting of various alternatives rather than a single answer. Consequently, the English major brings a dimension of critical thinking and problem solving to technical writing which his/her[1] more practically educated colleagues lack.

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[1] His/her is used here to show that the authors intend no gender bias by choice of pronouns. The masculine form of the third person singular is used throughout the remainder of the article for stylistic simplicity.

Analysis is a major element in the process of technical writing. Since the English major participates, repeatedly, in this manner of thinking during his formal education, his analytical skill becomes highly developed. Perceiving relationships, clarifying obscurities, determining requirements are steps necessary for every documentation project. These techniques are the same as those used in literary criticism; when applied to business and technology, the techniques translate into the ability to take disorganized, incomplete, and illogical information and transform it into a comprehensible, complete, usuable document.

The ability to do research is equally important to the technical writer as analysis, for the process of technical writing assumes more importance than content simply by the varied nature of the job entitled "technical writer." Since most companies employ only a few writers, those few are required to use many different forms: procedures, proposals, articles, and other informative publications. And not one of these reports, even the revisions of those previously written, is an exact repetition of content. The topics are diverse, ranging from accounting procedures, credit policies, computer hardware operation, data process (DP) control procedures, DP applications documentation, to company newsletters and annual reports. The English major-turned writer knows little about the specific topics prior to writing the documentation. He is successful in producing clear, well-organized, accurate, documents because of his understanding of the art of research. He is used to pursuing varied topics and investigating subtleties, and performing these tasks often in order to support the many essays he writes.

Organization is the third element in the process of technical communication. Once the writer has analyzed his topic and gathered all the facts, he must arrange them in a logical document suited to the requirements of the subject. Not only must he organize the information he researches and writes, but often he must assist one of his business or technical colleagues with the preparation of the document. The writer's ability to arrange the information in a coherent, logical form is always appreciated. Furthermore, providing such assistance establishes credibility for the professional writer by dispelling the myth that a writer's talent is limited to the creation of pretty phrases.

The organizational ability of the English major evolves two ways. First, English students learn this skill by understanding the basic organization of any essay: thesis statement (the purpose of the document), developmental details (all of the parts which support this purpose), and conclusion (tying together all details into a coherent whole). But the development of a keen sense of imagination also contributes to organizational skill. Before deciding on an approach to a literary work, the writer must use his imagination to visualize possible alternatives. In a similar manner, the technical writer must take a body of information and form it into various concepts to determine a suitable arrangement. The methodology of writing plus the imaginative dimension of the English major's skill enable him to produce a variety of organizational patterns and formats. Thus, the design of the document evolves not from some rigid, standardized scheme but from a format tailored to the needs of the particular document.

The fourth element in the process of technical writing is the ability to write well, to apply, correctly, the rules of usage, capitalization and punctuation, conciseness, syntactical arrangement, logic, and appropriate phrasing. Writing is technical in the sense that its successful practice is worthy of a technician, a literary technician.

Though an intuitive talent may underly the ability to write well, the art of writing develops primarily through hard work, practice, and unyielding devotion. The English major understands these requirements for good writing and has spent his undergraduate career preparing himself.

The final step in the process of technical writing is editing and publishing the document, a step filled with tedium. Although the English major does not learn the specific publication skills involved with mark-up, typesetting, and the print process, he does learn the most essential ingredient: precision. Like the other elements in technical writing, the precision required to complete a literary study is not applied in the same way as that required for a technical publication; however, final published form of both documents differs only in the kinds of details included. Whereas the literary paper must contain a bibliography and notes, the technical document may require other finishing details such as an appendix, index, glossary, exhibits. Whatever final ingredients are required to complete a document, each necessitates attention to detail.

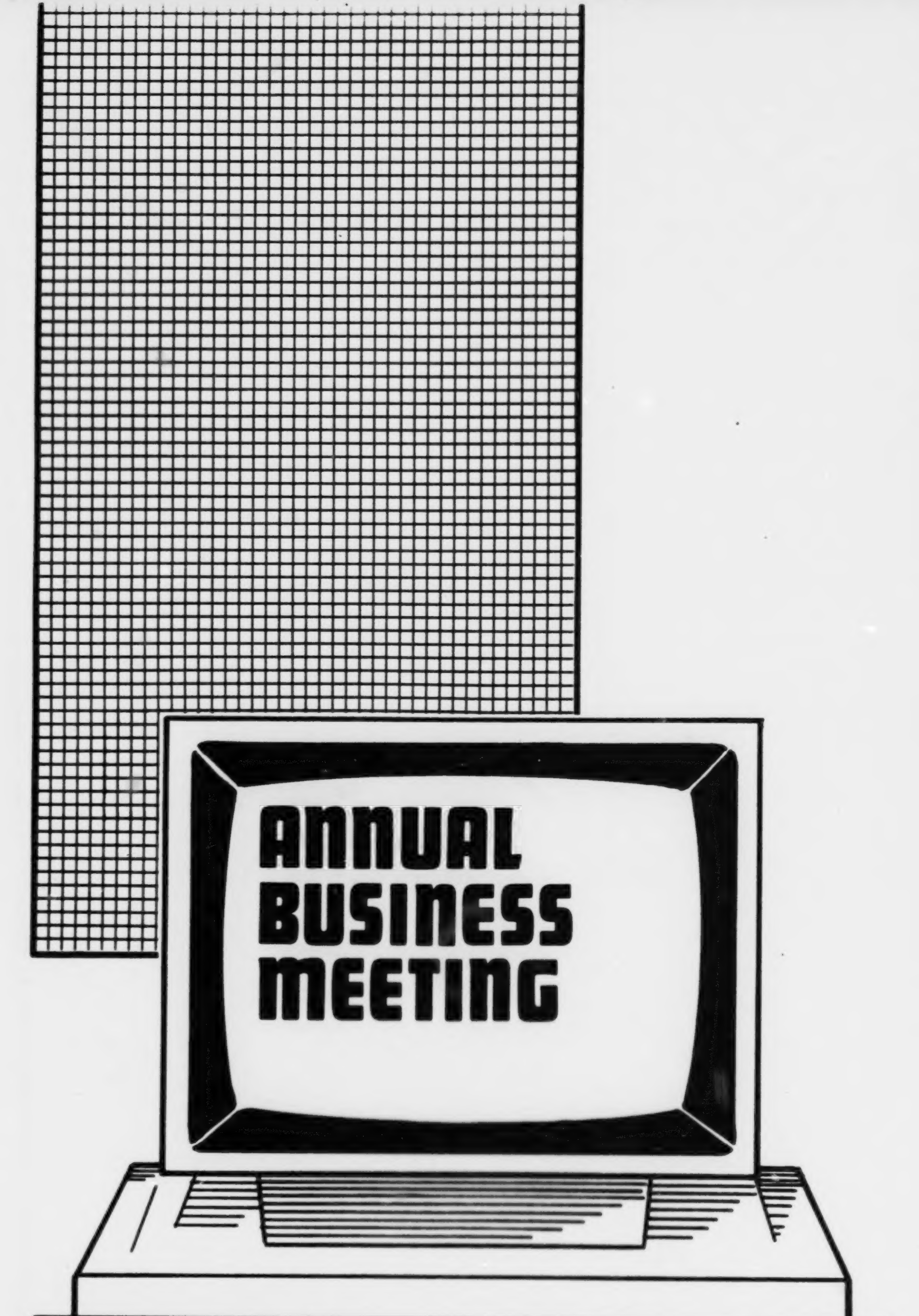
Finally, the English major brings to technical writing an element unrelated to the writing process but indispensable: the human element. Documentation does not have a life of its own; its sole purpose is to help people. The English major with his fundamental interest in the humanities is sensitive to this requirement. The highest praise and most accurate evaluation of a technical document is not the sleekness of its appearance, the correctness of its sentence structure and grammar, nor even the accuracy of its content, but the comment of its user: "This manual really helped me understand the personnel policies of the company, . . . the procedures for balancing the accounts payable journal, . . . the way the word processing software works."

Conclusion

The English major-turned technical writer does not learn all he needs to know about technical communication in his English literature courses. He needs job experience in technical writing, and he acquires that after years in the field. English departments may assist the student in any discipline in his transition from the academy to the work place by offering technical writing courses to augment literature courses. The combination of these courses will develop competent technical communicators who more effectively inform specialized audiences and a general population eager for assistance in an increasingly technological society.

If the question in the minds of English department faculty continues to be, "Do technical writing courses contain subject matter consistent with the humane content found in literature courses?" let these faculty look to the careers of recently hired technical communicators, many who were undergraduate English majors. These new communicators experience the process of technical writing daily.

If the profession of technical writing demands the abilities to problem-solve, analyze, research, and write, if follows that technical writing courses which reflect the work place experience are consistent with the content of literature courses.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Kathy Rentz
University of Cincinnati

Mark Rollins
Ohio University

Robert Ryan
Clark College

Marilyn Samuels
Case Western Reserve University

Scott Sanders
University of New Mexico

Terry Skelton
Air Force Institute

Barbara Smith
Alderson-Broaddus College

Katherine Staples
Austin Community College

Dwight Stevenson
University of Michigan

Gilbert Storms
Miami University

Andrea Walter
Illinois Institute of Technology

Victoria Winkler
University of Minnesota

Kristen Woolever
Northeastern University

MINUTES
12TH ANNUAL MEETING-CPTSC
February 17, 1986
Oxford, Ohio

The Business Meeting was called to order at 1:35 by President Patrick Kelley

Mr. Kelley took the opportunity to thank Paul Anderson and Jean Lutz of Miami University for their hospitality.

Announcments and Reports

1. The Secretary presented the minutes of the 11th Annual Business Meeting. The Council approved those minutes.

2. Sam Geonetta presented the Treasurer's report. That was approved by the Council.

3. Patrick Kelley announced that the cooperative publication with the STC--a directory of technical communication programs--was about to go to press. He distributed preliminary graphics for the use of the Council.

4. Mr Kelley announced that ERIC has accepted the CPTSC *Proceedings* for inclusion in the microsystem.

Business:

1. The Council confirmed Clark Community College in Vancouver, Washington as the site for the 1986 Annual Meeting; based on Tom Pearsall's keynote speech from the 1984 Annual Meeting, the topic of "quality was identified.

2. The Council confirmed Rochester Institute of Technology for the 1987 meeting. Discussion regarding a shift in meeting dates was tabled until the 1986 Business Meeting.

3. The following offered to host the 1988 Annual meeting:

   Gloria Jaffe--University of Central Florida, Orlando
   Sherry Little--San Diego State University

4. The Council discussed the need for some person to serve as liason with public and private funding agencies to help them identify grant monies for technical communication research projects. Marilyn Sammuels offered to look into this and to present information for discussion at the 1986 meeting.

The meeting was adjourned at 2:55

Respectfully submitted,
Andrea C. Walter, Secretary
February 17, 1986

This report on the treasury of the Council for Programs in Technical and Scientific Communication was current as of March 1, 1985.

Credits

Balance brought forward (August 14, 1984)	$1,690.22
Memberships: 19 renewals + 4 new = 23 x $15.00	345.00
Sales of past *Proceedings*	57.00
Interest (August, 1984-February, 1985)	43.99
	2,136.21

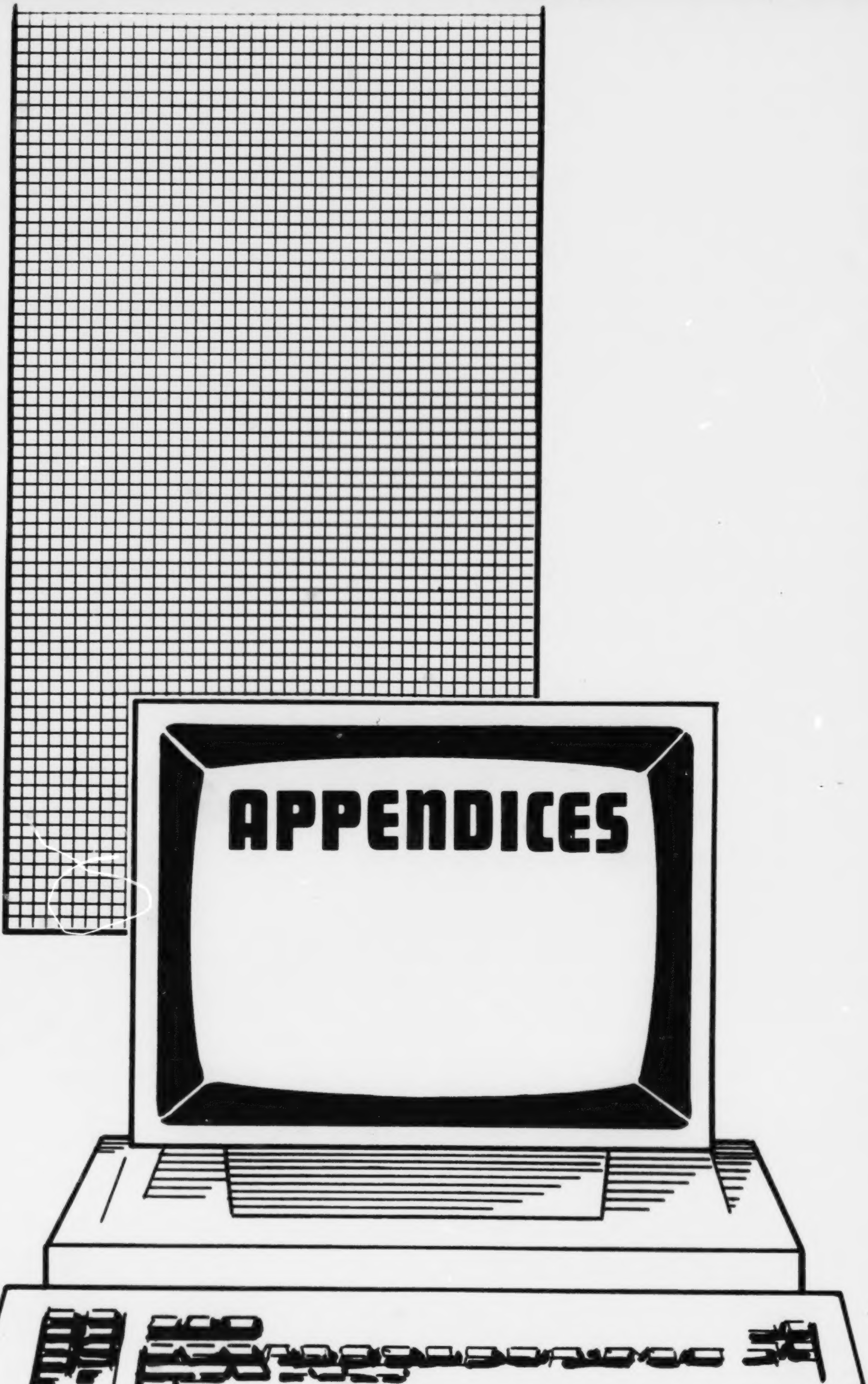
Debits

Checks	2.25
Postage, stationery	6.69
Printing, binding and distributing *Proceedings* 1984	880.32
	(889.26)
Balance	$1,246.95

Respectfully submitted,

Sam C Geonetta

Sam C. Geonetta
Treasurer


APPENDICES

APPENDIX A: CONSTITUTION

(As Amended 1981)

ARTICLE I
NAME:

The name of the organization shall be Council for Programs in Technical and Scientific Communication.

ARTICLE II
PURPOSE:

The primary purposes of the organization shall be to (1) promote programs in technical and scientific communication, (2) promote research in technical and scientific communication, (3) develop opportunities for the exchange of ideas and information concerning programs, research, and career opportunities, (4) assist in the development of new programs in technical and scientific communication, and (5) promote exchange of information between this organization and interested parties. Said organization is organized exclusively for educational purposes.

ARTICLE III
MEMBERSHIP:

Membership shall be open to any individual or institution interested in supporting the purposes identified in Article II. Individuals or institutions whose primary responsibilities or functions are education shall be designated Regular Voting Members. Others shall be designated Special Non-Voting Members. Membership shall be open to any person without regard for race, age, sex, or religious affiliation.

ARTICLE IV
OFFICERS:

The officers of the organization shall be president, vice-president, secretary, and treasurer, each to be elected for a two-year term.

The duties of the officers shall be:

President:
1) preside at the annual national convention of the organization.
2) represent the organization at official functions.
3) serve as chairman of the executive committee.

Vice President:
1) perform all the duties of the president in the event of the president's absence.

Secretary: 1) maintain all records of the organization including matters of correspondence.

Treasurer: 1) handle all financial matters of the organization including the receiving and recording of dues and payments and paying the bills of the organization.
2) maintain an up-to-date membership list.

The president, vice president, secretary, and treasurer, plus the immediate past president and one member-at-large, elected by the membership, shall serve as an executive committee. The executive committee shall have the right to act on the behalf of the organization at such times as the organization is not meeting in full assembly except to change the constitution or carry out elections.

ARTICLE V
LIMITS:

No part of the net earning of the organization shall inure to the benefit of, or be distributable to its members, trustees, officers, or other private persons, except that the organization shall be authorized and empowered to pay reasonable compensation for services rendered and to make payments and distributions in furtherance of the purposes set forth in Article III hereof. No substantial part of the activities of the organization shall be the carrying out of propaganda, or otherwise attempting to influence legislation, and the organization shall not participate in, or intervene in (including the publishing or distribution of statements) any political campaign on behalf of any candidate for public office. Notwithstanding any other provision of these articles, the organization shall not carry on any other activities not permitted to be carried on (a) by a corporation exempt from Federal income tax under section 501 (c) (3) of the Internal Revenue Code of 1954 (or the corresponding provision of any future United States Internal Revenue Law) or (b) by a corporation, contributions to which are deductible under section 170 (e) (2) of the Internal Revenue Code of 1954 (or corresponding provision of any future United States Internal Revenue Law).

ARTICLE VI
MEETINGS:

The organization shall meet in full convention annually. The location of the annual meeting shall be determined by vote of assembly at the preceding convention. The approximate date of the meeting shall also be established.

Special meetings of the organization may be held at need as determined by the executive committee.

ARTICLE VII
FINANCES:

The dues for the organization shall be $15.00 per year for Regular Voting Members and $50.00 for Special Non-Voting Members. All dues are payable prior to or upon registration at the annual meeting.

ARTICLE VIII
ELECTIONS:

The election of officers and members-at-large to the executive committee shall be held at the annual meeting. The existing executive committee shall each year nominate a slate of officers and a member-at-large and have this slate in the hands of the membership 30 days before the annual meeting. Nominations will also be allowed from the floor at the annual meeting. Elections shall be by written ballot.

ARTICLE IX
CONSTITUTIONAL AMENDMENT:

This constitution shall be amendable by a two-thirds vote of the assembly present and voting at the annual meeting. Proposed amendments to the constitution must be in the hands of the members at least two months in advance of the annual meeting at which the vote is to be taken.

ARTICLE X
DISSOLUTION:

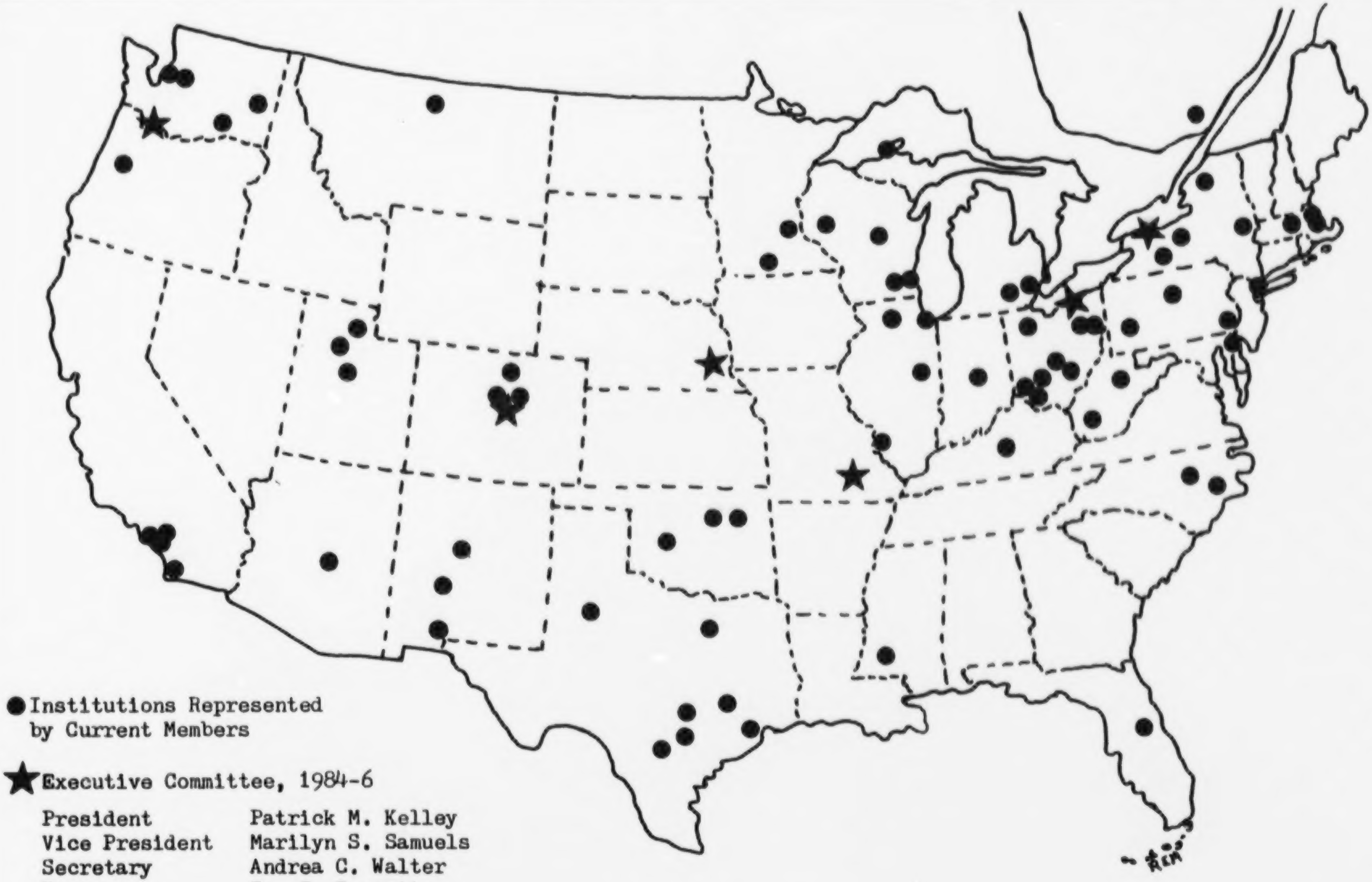
Upon the dissolution of the organization, the Board of Directors shall, after paying or making provision for the payment of all of the liabilities of the organization, dispose of all of the assets of the organization exclusively for the purposes of the organization in such manner, or to such organization or organizations organized and operated exclusively for charitable, educational, religious, or scientific purposes as shall at the time qualify as an exempt organization or organizations under section 501 (c) (3) of the Internal Revenue Code of 1954 (or the corresponding provision of any future United States Internal Revenue Law), as the Board of Directors shall determine. Any such assets not so disposed of shall be disposed of by the Court of Common Pleas of the county in which the principal office of the corporation is then located, exclusively for such purposes or to such organization or organizations, as said Court shall determine, which are organized and operated exclusively for such purposes.

ARTICLE XI
PARLIAMENTARY AUTHORITY:

All official meetings, of the organization, shall be conducted according to the *Standard Code of Parliamentary Procedure* by Alice B. Sturgis. The presiding officer shall appoint a parliamentarian to advise the assembly at each annual meeting.

APPENDIX B: ANNUAL MEETINGS, SITES, AND DATES

1st	University of Minnesota	St. Paul, MN	1974
2nd	Boston University	Boston, MA	1975
3rd	Colorado State University	Fort Collins, CO	1976
4th	University of Minnesota	St. Paul, MN	1977
5th	Rensselaer Polytechnic Institute	Troy, NY	1978
6th	Oklahoma State University	Stillwater, OK	1979
7th	University of Central Forida	Orlando, FL	1980
8th	University of Washington	Seattle, WA	1981
9th	Carnegie-Mellon University	Pittsburgh, PA	1982
10th	University of Nebraska	Lincoln, NE	1983
11th	La Fonda	Santa Fe, NM	1984
12th	Miami University	Oxford, OH	1985
13th	Clark Community College	Portland, OR/ Vancouver, WA	1986
14th	Rochester Institute of Technology	Rochester, NY	1987
15th	University of Central Florida	Orlando, FL	1988
16th	San Diego State University	San Diego, CA	1989


● Institutions Represented by Current Members
★ Executive Committee, 1984-6
RCM

President	Patrick M. Kelley
Vice President	Marilyn S. Samuels
Secretary	Andrea C. Walter
Treasurer	Sam C. Geonetta
Member-at-Large	JoAnn T. Hackos
Past President	Virginia A. Book

APPENDIX C: EXECUTIVE COMMITTEE AND INSTITUTIONS REPRESENTED BY CURRENT MEMBERS

APPENDIX D: MEMBERS IN 1985

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237

APPENDIX E:

TABLE OF CONTENTS, COUNCIL FOR PROGRAMS IN TECHNICAL AND SCIENTIFIC COMMUNICATION (CPTSC) PROCEEDINGS 1974-1984

1974, University of Minnesota, March 21-23, 1974

Conferees

Introductory Summary
Thomas E. Pearsall

Internship Programs and Job Interviews at Rensselaer Polytechnic Institute
Wayne A. Losano

Internship Programs at Iowa State University
Jerome L. Nelson

The Three Programs in Communication at Rensselaer Polytechnic Institute
Robert W. Elmer

A Technical Writing and Editing Degree
Beekman W. Cottrell

Science Communication at Boston University
Harold G. Buchbinder

Innovations in the Michigan Tech Program
Clarence A. Andrews

Technical Journalism at Colorado State University
Bruce Linn

They Also Serve Who Only Stand and Wait
L. David Schuelke

1975, Boston University, April 9-11, 1975

Introduction
Thomas E. Pearsall

Participants

Fund Raising
Harold G. Buchbinder
Joyce Patterson

The Role of the Society for Technical Communication
Robert F. Ellis, M. L. White, Richard E. Wiegand

Communication Theory and Technical Communication
Jerome L. Nelson, Jan Robbins

Technical Communication and the Community College
Russell Briggs, Thomas L. Warren, John F. White

Student Recruitment
Clarence A. Andrews

Non-Written Technical Communication
James E. Connolly

A Roundtable Letter
David G. Clark

1976, Colorado State University, No Proceedings

1977, University of Minnesota, April 14-15, 1977

Vice-President's Report of the Council's Resource Materials Project
Thomas L. Warren

Relationship Between the Council for Programs in Technical and Scientific Communication and the Society for Technical Communication
Myron L. White

Possible Certification of Technical Communicators by STC
Richard M. Davis

The RPI Graduate Student in Technical Writing, Class of '77: The Role of the Humanist in Technical Communication
David L. Carson

Criteria for Appointment and Promotion of Teachers of Technical Communication
Robert R. Rathbone

A Proposal for Planning and Achieving a Program for Educating Handicapped to Become Technical and Scientific Translators
H. S. Bruce Linn

Internship Programs in Technical Communications for the Technical Student
Leslie A. Olsen

Technical Advertising--Classes that Would Have Helped
Karen Bunting

Graduate Programs in Biomedical Communication
Kenneth L. Kuczynaski

New Program Development at Texas A&M
Merrill D. Whitburn

Constitution

1978, Rensselaer Polytechnic Institute, April 19-21

President's Opening Remarks
Thomas E. Pearsall

Some Remarks on Technical Communication
Jay R. Gould

Report From the Member at Large
Virginia Book

STC and Its Role in Education
R. Frank Hammet

Design as a Communication Model
Philip M. Rubens

A View From the Computer Industry
Joseph T. Rigo

Applications of Communication Theory and Cybernetics to Technical Communication
George A. Barnett

An Undergraduate English Major with an Emphasis in Technical Writing
Paul V. Anderson

An Interdisciplinary Course in Technical Writing
Wayne A. Losano

The Teaching of Technical Communication in Australia
Thomas C. Dixon

Training Apprentice Editors
Freda F. Stohrer

A Course on Graphics and Audiovisuals in Technical Communication
David L. Carson and Craig Harkins

Recipe for a Cooperative Technical Editing Program
Bruce M. Kantrowitz

Some Beginnings in Research for Technical Communication
Leon C. Hull

Intergovernmental Mobility Program

List of Participants 1978 Meeting

1979, Oklahoma State University, April 26-27

Introduction
Gordon Weaver

Purposes Mistook Fall'n on th' Inventors Heads
Virginia Book

The Traditional Graduate Student's View of Teaching Technical Writing: To Retread or Not!
Gary C. Poffenbarger

A Report on the 1977 STC Survey
Bill Coggin

Technical Writing and Other Writing Courses
Roland A. Browne

Buggy-whip Making 301 and 302
Roland A. Browne

Staffing Problems in STC Programs
Philip M. Rubens

Technical Writing and the Traditional English Department
Roland A. Browne

Procrustean or Paradigmatic: A Model for Research in Written Composition
Stephen P. Witte

Publicizing Your Technical Writing Program, On- and Off-Campus
Martha Eckman

Faculty and Marketing Liberal Arts Graduates
Larry M. Hynson, Jr.

Future Trends in Technical Communication--A Brief Look in Both Directions
Robert D. Resing

1980, Florida Technological University, February 13-15

Technical Communication by Non-Verbal Means
J. Paul Hartman

Alternative Forms in Oral Technical Communication
Sam C. Geonetta

Impacts of the Computer on Technical Communication: Publications Department Manager
Robert D. Beckhorn

Technical Writing in the Community College
Elizabeth R. Turpin

Guidelines for Establishing and Supervising Student Internships in Technical Communication and Mass Media
Elizabeth R. Turpin

Gaining Support for a Technical Communication Program at a Two-Year General Purpose University
Bill Coggin

Computer Impact on Teaching Technical Communication
Philip M. Rubens

Technical Writing for Engineering Students at the Community College
Mary Beth Debs

A Proposed, Terminal Two-Year Technical Communication Program
Steven M. Gerson

Eastern Washington University Program in Professional Writing
Kathy Stege

Problems of Developing an Undergraduate Degree Program in Technical Communication in a General-Purpose University
Butler H. Waugh

Developing a Graduate Degree Program in Technical Communication
Patrick M. Kelley

Internship Programs: Current Practices and Future Changes
R. John Brockmann

1981, University of Washington, April 23-24

Preface

1981 Conference Program

Technical Writing at Case Western Reserve University: A Possible Bridge Between the Humanities and Technology
Marilyn Schauer Samuels

Developing the Technical Writing Class: Heterogeneous vs. Homogeneous
Gary C. Poffenbarger

The Oral Communication Laboratory
Sam Geonetta

A New Degree Option in Technical Writing at Oklahoma State University
Thomas L. Warren

New Courses at Eastern Washington University
Judith Kaufman

Writing for Special Purposes: Updating the Program at the University of Minnesota
Victoria M. Winkler

The Technical Component of Degree Programs
William O. Coggin

Proposed Master's in Technical Writing at Oregon State University
Simon S. Johnson

A Proposed Master of Technical and Scientific Communication: Some New Approaches to Old Problems in Program Design
Paul V. Anderson

A New Pragmatic: A Nonpragmatic, Intellectual Rationale for Technical Writing Graduate Study
Carol S. Lipson

The Master's Program in Professional Writing at Carnegie-Mellon University
Beekman W. Cottrell

Business Meeting
List of 1981 Attendees

Minutes of 1981 CPTSC Meeting

Minutes of 1980 CPTSC Meeting

Treasurer's Report

CPTSC Constitution

Proposed Amendments to the Constitution

Appendix A

CPTSC Members and Former Members

1982, Carnegie-Mellon University, April 15-16

A Note from the President
Virginia A. Book

Program

Papers

Books, Books, Everywhere , and Nary a Drop to be Found
Carol Lipson, Syracuse University

Proposed Master of Science Degree in Communication Systems
Judith Kaufman, Eastern Washington University

Alive and Growing: Technical Writing Programs at Northeastern University in Boston
Helen M. Loeb, Northeastern University

A Technical Communication Program at Rochester Institute of Technology
Andrea Corcoran Walter, Rochester Institute of Technology

A Master of Science Program in Technical and Science Communication
Stephen C. Brennan, Drexel University

Model for a Minor Program in Technical Writing
Joseph C. Mancuso, North Texas State University

Coordinating the Teaching of Writing Processes in a Technical Writing Program
Patrick M. Kelley, New Mexico State University

Teaching Writing Processes in Technical Writing at the Introductory Undergraduate Level
Louise Merck Vest and Patrick M. Kelley, New Mexico State University

Teaching Writing Processes in Technical Writing at the Advanced Undergraduate Level
O. Jane Allen, New Mexico State University

Teaching Writing Processes in Technical Writing at the Graduate Level
Roger E. Masse, New Mexico State University

The Guided Design Approach to the Teaching of Technical Communication
Barbara A. Smith, Alderson-Broaddus College

Resources for Teaching Business and Professional Speaking for Students of Technical Communication
Sam C. Geonetta, University of Missouri-Rolla

Possible Applications of Cognitive Science and Problem Solving to Technical Writing
Marilyn Schauer Samuels, Case Western Reserve

New Directions for Graduate Study in Scientific and Technical Communication Programs
Mary B. Coney, University of Washington

How Not to Theorize about Technical Discourse: The Lesson of Literary Theory
Ben F. Barton and Marthalee S. Barton, University of Michigan

The Professional Work Station and Information Management: Future Directions for Research
Ben F. Barton and Marthalee S. Barton, University of Michigan

New Directions for Study in Technical Communication: A Response
    William O. Coggin, Bowling Green State University

Annual Business Meeitng
    Participants in 1982

    Secretary's Minutes for 1982

    Treasurer's Report for 1981-82

Appendices
    Appendix A: Constitution (As Amended, 1981)

    Appendix B: Executive Committee, 1982-84, and Institutions Represented by Current Members

    Appendix C: Current Members

1983, University of Nebraska, April 7-8

From the President--Virginia Book

Program

Papers

The Technical Writing Program at Oklahoma State University: Changes and Modifications
    Thomas L. Warren, Oklahoma State University

The Internship Program at Oklahoma State University
    Sherry G. Southard, Oklahoma State University

Engineering a Professional Technical Communication Degree
    Victoria M. Winkler, University of Minnesota

Undergraduate and Graduate Programs in Technical Writing at Penn State
    Jack Selzer, Pennsylvania State University

Technical Writing Internships at Eastern Washington University
    Judith Kaufman, Eastern Washington University

A Two-Year Progress Report on the Technical Writing Program at Case Western Reserve University: What's New on Euclid Avenue?
Marilyn Schauer Samuels, Case Western Reserve University

Teaching Problem-Solving Strategies in the Technical Communication Classroom
JoAnn T. Hackos, University of Colorado at Denver

"Breadth and Depth" for Engineering and Science Students: The Communication Minor at the University of Missouri-Rolla
Sam C. Geonetta, University of Missouri-Rolla

Planning a Technical Writing Program at Kansas Technical Institute
Dale Sullivan, Kansas Technical Institute

A Contemplative View of Technical Writing
Carol Lipson, Syracuse University

Annual Business Meeting
Participants and Guests in 1983

Secretary's Minutes for 1983

Treasurer's Report for 1982-83

Appendices

Appendix A: Constitution (As Amended 1981)

Appendix B: Annual Meetings, Sites, and Dates

Appendix C: Executive Committee and Institutions Represented by Current Members

Appendix D: Current Members

1984, Santa Fe, New Mexico, February 23-24

From the President: CPTSC at Present
Patrick M. Kelley

From the Vice President: A Look at the Near Future
Marilyn S. Samuels

Program

Keynote Papers

Faith Without Works is Dead
Thomas E. Pearsall, University of Minnesota

"History Is Philosophy from Examples": Technical Writing Yesterday and Today
Thomas L. Warren, Oklahoma State University

Papers

A Graduate Studies Proposal
James W. Souther, University of Washington

Filling a Felt Need: The Master of Arts in Professional Writing
Beekman W. Cottrell, Carnegie-Mellon University

An M. A. in English with a Special Option in Technical Writing: From Theory to Practice at Oklahoma State University
Sherry G. Southard, Oklahoma State University

The Role of Linguistics and Language Study in the Technical Writing Program at Oklahoma State University
Bruce Southard, Oklahoma State University

Developing a Master of Science Degree in Communications
Judith Kaufman, Eastern Washington University

When Technical Communication is the Only Humanities Degree
James R. Corey and Scott P. Sanders, New Mexico Tech

The Writing Specialization--Preparing Writers for the World of Work
Elizabeth Tebeaux, Texas A&M University

The Certificate Program at San Diego State University
Sherry Burgus Little, San Diego State University

A Technical Writing Program: Implications of Research and Experience
Carol Lipson, Syracuse University

An In-House Writing Program: Teaching the Writing Process in a Laboratory Setting
Irene D. Hays, Battelle, Pacific Northwest Laboratories

Rochester Co-op in Technical Communication
Andrea C. Walter, Rochester Institute of Technology

Televised Technical Writing: Teaching on Network Northeastern University
Helen M. Loeb, Northeastern University

Required: Three Hours of Tech. Writ. Ur-Program and Stepchild of Technical Communications
Laura Rhodes Casari, University of Nebraska

A New Course: Technical and Scientific Literature
Joseph C. Mancuso, North Texas State University

A Graduate Seminar in the Theory and Practice of Technical Writing
Jack Selzer, Pennsylvania State University

The Multi-Option Format in Teaching Communication Theory
Sam C. Geonetta, University of Missouri-Rolla

Field Paradigms: The Relation Between the Technical Communicator and the Technical Team
Richard Watson, Chapman College

Annual Business Meeting

Participants in 1984

Secretary's Minutes for 1984

Treasurer's Report for 1983-84

Appendices

Appendix A: Constitution

Appendix B: Annual Meetings, Sites, and Dates

Appendix C: Executive Committee and Institutions Represented by Current Members

Appendix D: Members in 1984